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Amateur Radio

CQ

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MAY 1998

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ON THE COVER: If you consider yourself a contester and you've never heard of this guy, you really ought to get out more! Frank Donovan, W3LPL, hosts one of the premier multi-operator, multi-transmitter contest stations in the world from this Glenwood, MD QTH, producing consistent world-class scores. What goes unrecognized by too many contesters is the enormous support of the pursuit of great contesting performance that is provided by gracious and generous station owners such as W3LPL. Our hats are off to you, Mr. Donovan. (Photo by Larry Mulvehill, WB2ZPI)

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ZERO BIAS

AN EDITORIAL

Some things when retold sound more like wishful thinking or embellishment than the simple, unadorned truth. An amateur walked up to the *CQ* booth at the Charlotte Hamfest in early March and told me a remarkable story—in fact, the story of his amateur radio odyssey. The story starts with him as a very young man looking through some magazines at a newsstand and coming across *CQ*. He wasn't an amateur and really didn't know anything about amateur radio, but he was intrigued enough by the cover to buy the issue. He said that after reading the issue he became interested enough in amateur radio to seek out other material and eventually get his license. Having his license and an avid interest in the hobby prompted his career choice of engineering as a course of study in college. Several career moves later, with obvious success, found him talking to me about running a major TV station in the area. All of what he related to me came about through the serendipitous choice of which magazine to buy.

A little later that day I was relating the story to Joe Fairclough, WB2JKJ, who was at the hamfest representing the kids at JHS 22. I asked him about the long-range follow-up, since his program has been running for quite a while. Yes, he said, amateur radio has played a dramatic role in a lot of the kids' lives, sometimes resulting in remarkable turnarounds and new directions. He did go on to add that quite a number had gone on to other schools and careers and families of their own. Some still could be found on the amateur radio bands, although these days a larger number were easier to track via the Internet.

While these stories are heart-warming and accurately portray the potential for amateur radio to me and a lot of you, there was and is something missing from this equation. I'm not exactly sure what it is, but part of it was articulated by some of the hamfest officials later that day when they bemoaned the fact that there were practically no young people attending despite large mailings to licensed amateurs. No, I didn't have an answer as to why either. I offered the suggestion that they send out mailings to all high schools offering free admittance to the hamfest to see amateur radio. I don't know if it would have been worth the effort, but on the other hand, most of those young people wouldn't have shown up anyway, so the hamfest wouldn't have lost any money on them. However, the more I thought about the whole day, the more I thought that there really wasn't this great hoard of young people out there just waiting for the subtle stimuli or serendipitous moment to join our ranks. Sure, we all can cite numbers of young people who come to the hobby via this route. However, for whatever reason, young or older, in terms of absolute numbers we're at an all-time high in amateur radio population. I think it's probably closer to the truth to say that for the most part we have no idea who they are, how old they are, and most of all, what they're doing. Obviously, they're not like "us," and some of them, or a lot of them, might not be "real," but there they are, doing whatever. Whatever they're doing (or not doing) is making a lot of us uncomfortable. While we want more people, especially more young people, we are somehow saying we want more of "us" and less of "them."

I guess the closest analogy would be where you choose to live. At some point you strike out and move to a nice place in the suburbs—a place with trees, room, and a slow, relaxed way of life. It's a good place to raise the kids, string a few antennas, and enjoy what life has to offer. Well, years go by, and little by little more people move into that sleepy hamlet looking for the very same thing you did. Property gets subdivided as more homes are built, local taxes inch up as the demand for goods and services increase, and before you know it, you now need all sorts of permits for that antenna. The "new" people, whoever they are, have slowly and methodically taken over the community. While we still don't know who they are, we start to feel hemmed in by the undeserving, ever-demanding interlopers, who by now certainly outnumber "us." Life has changed right under our noses, and we can't bring back what once was.

Maybe that's where we are both environmentally and emotionally, living in a neighborhood that we thought we knew. Maybe things and values should stay the same, but they don't. This isn't unique to amateur radio. It is found in a lot of other activities that people of my generation and probably yours are experiencing. The "neighborhood" of a lot of these activities has changed ever so slightly, year by year. No pain, no muss, no fuss, until it seems to have happened overnight. The young people are still there, but a lot of them are doing things and pursuing things that weren't even an option to us at their age.

As far as the "neighborhood" goes, look around and you'll see that it's probably far better than the day you moved in. All the goods and services that you deem necessary and now have gotten used to wouldn't have been possible without the new people. I know it was hard for some of us to give up our Nehru jackets and polyester leisure suits, but we did and the world didn't end. Maybe now is the time to think in terms of or accept the fact that a lot of kids growing up these days are not like "us" and don't want the same things we did at their age. We tend to look at them in terms of immediate gratification for everything, and perhaps it's just as simple as return on investment. If we tend to spend our time bickering, differentiating, condescending, and moralizing (without portfolio, I might add), then we really don't present an image that young people want to invest time and effort to become. Let's face it: The only good time a bunch of us have is when we're criticizing "them" and talking about how "they" should be and what "they" should do.

Judging from newspaper ads and "Things To Do" columns, it seems that more young people are into collectables of a sort. Every week there are notices for numerous comic book and sports memorabilia shows across our area. Things are bought, sold, traded, and held onto not so much for their intrinsic value, but for their commercial value in time to come. All sorts of people collect all sorts of things, hoping to cash in big time before the bottom drops out of the market. Young people will spend hours on line and spend a few bucks (or lots of bucks) to get a sports figure's autograph, which then becomes a commodity. The Internet becomes a vehicle for generating revenue and/or other goods. Young people have become capitalists.

These days, amateur radio is an intrinsic hobby. We (some of us) invest time, money, and effort in doing something that makes use of our time without generating a bit of revenue. It's something we enjoy in and of itself. It's something that when we invest time, effort, and money, we do primarily at retail, and when we dispose of the commodity it's generally at a financial loss. The difference (loss) in funds is reconciled as use and enjoyment. What we have traditionally considered as hobbies and pastimes are just that, not a subtle business venture. Today's youth are more venture capitalists in their outlook than we ever were. Maybe as youths we had visions of becoming engineers and having careers based on our exposure to amateur radio, but these days goals are reeled in to short-term gains. Buy a few special stuffed animal toys for about six bucks each, hold onto them for a few months, and then sell them via the Internet for a few hundred bucks each.

By the end of Cycle 23 there probably will be another couple of hundred thousand licensed amateurs out there who may or may not be young. Right now there are about a half million amateurs out there who have their own agenda with regard to themselves and amateur radio and don't belong to our organizations, share our values, or apparently want to be like "us." In ten or eleven years that number could be seven or eight hundred thousand. Young people may or may not be in our ranks right now, and although why more of them don't go to hamfests and other functions is interesting to debate, it probably would be just as interesting to find out why more older amateurs don't come out either. By the way, at Charlotte, even on Sunday morning there was absolutely no shortage of young and old people at the woodworking show next door. No, I don't think it's simply because we as amateurs are more religious as a group. I think in some way they've found a better way to attract people to their pastime, and perhaps it's time to look beyond what hasn't worked for us in a long time.

73, Alan, K2EEK

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ANNOUNCEMENTS

•Space Symposium/AMSAT Call for Papers. This is the first call for authors who wish to present papers at the 16th Annual AMSAT Meeting and Space Symposium, October 16–18, 1998 at the Park Inn International, Vicksburg, Mississippi. Subject matter should be of interest to the amateur radio satellite service. One page abstracts are due no later than June 1. Authors will be advised shortly after June 15 regarding acceptance of papers. Camera ready copies are due no later than August 15. Abstarcts can be sent to <w5xx@magnolia.net> or to Malcolm Keown, W5XX, 14 Lake Circle Drive, Vicksburg, MS 39180. Details on arrangements for the symposium and meeting can be found at <http://pages.prodigy.com/DXHF93A>.

• The following Special Events will take place in May:

KA1WOR, from the 4th annual Hurrican Expo, New Port Richey, Florida; Pasco County R.A.C.E.S.; 1400–1800Z May 30; phone 14.250± and 28.325±. For certificate send QSL and 9 × 12 SASE to Michele L. Baker, Director, Office of Disaster Preparedness, 8744 Government Drive, New Port Richey, FL 34654.

W1ACT/P, mini-DXpedition from Gay Head Cliffs and Lighthouse, Martha's Vineyard Islands, Massachusetts (IOTA NA-046); Fall River ARC; May 1–3, on or near IOTA net frequencies and all Extra class privileges, propagation permitting. QSL via N1JOY, Ronald Daignault, Jr., 19 Davis Road, Westport, MA 02790 (e-mail: <roland-d@ici.net>.

KB2YCT, from Nutley, New Jersey, "CQ Memorial Day"; 2200Z May 22 to 2200Z May 25 on 28.420, 52.525, and 146.550. QSL to: RDGULARA, P.O. Box 716, Nutley, NJ 07110-0716.

N2MO, from Wall, New Jersey, original Marconi antenna site; Ocean Monmouth ARC; 1400Z May 16 to 1400Z May 17 on 80–10 meters in General portion of the bands SSB and CW. QSL with SASE to: OMARC, P.O. Box 267, Oakhurst, NJ 07755.

W2CVT, from home of Samuel F. B. Morse, Poughkeepsie, New York; Poughkeepsie ARC, 1300–2100Z May 16–17 on 3.680, 7.105, 10.105, 14.050. QSL/certificate Don Stein, 3 Little Road, Wappingers Falls, NY 12590.

W2O, from 1998 ARRL Midwest/Dakota Division Convention/Hamboree 20, South Sioux City, Nebraska; 3900 Club & Sooland ARA; May 22–31. For QSL/ certificate, send business-size SASE to Tim Jarman, KØUX, 3159 Dearborn Blvd., Sioux City, IA 51104.

3-land, from Thomas Walters pilot house, Great Lakes Marine & US Coast Guard Memorial Museum, Ashtabula, Ohio, for National Safe Boating Week; U.S. Power Squadron's Amateur Radio Net; 1400–2200Z May 23 on 7.267, 14.267, 21.367, 28.367 MHz. Send QSL and SASE (for flat certificate 9 × 12 SASE) to Donald Stark, N3HOW/8, 65 Stark Spur, Eighty Four, PA 15330-2547.

K3ARS, from 1998 re-enactment of the 1774 Chestertown Tea Party, Chestertown, Maryland; Kent ARS; 1400–2100Z May 23 on 7040, 7240, 14240, 28340. For certificate send QSL and 9 × 12 SASE to William Rogers, N2UYW, P.O. Box 427, Chestertown, MD 21620.

WA3BAT, from 100th anniversary of Admiral Dewey's triumph over the Spanish fleet at the Battle of Manila Bay, Independence Seaport of Philadelphia, Pennsylvania; Olympia ARC; 1300Z May 2 to 2200Z May 3 on SSB/phone 3.898.5, 7.248.5, 14.248.5, 21.368.5, 28.368.5, 145.270 FM; CW 7.030/7.110, 14.030, 21.040/21.110, 28.025. For certificate, send QSL and 9 × 12 SASE to Olympia ARC, Independence Seaport of Philadephia, 211 South Columbus Blvd., Philadelphia, PA 19106.

NJ4F, from 135th anniversary of the Civil War battle of Chancellorsville, Virginia; Rappahannock Valley ARC; 1500–2100Z May 2 in General portion of 20 and 40 meter phone bands (14245/7245). For certificate send large SASE to: RVARC, Box 1496, Fredericksburg, VA 22402.

KC5PCN, from Palmito Hill, site of last battle of Civil War, near Brownsville, Texas; Charro ARC; May 2 in phone protion of Novice 10 meters and General 15 and 20 meters. For certificate send QSL and 9 × 12 SASE to Charro ARC, 3554 Boca Chica, Brownsville, TX 78521.

W5SAM, from site of statue of Sam Houston, Huntsville, Texas; Sam Houston Radio Society; 1300–2200Z May 23 on or near 14.240, 21.300, and 28.495. For QSL send QSL and business-size SASE to Sam Houston Radio Society, 407 Elkins Lake, Huntsville, TX 77340.

W6P, from National Police Week Memorial; Cops Contest Club; 0000Z May 10 to 2400Z May 17 on 28490, 21390, 14290, 7290, and 3890. For certificate send QSL and 9 × 12 envelope with 78 cents postage to K6BZ, P.O. Box 252, Igo, CA 96047.

KC7KHS, from Miles City Bucking Horse Sale, Miles City, Montana; 1500Z May 16 to 0100Z May 17 on 14.265 and 28.400. For certificate send 9 × 12 SASE to Randy Schock, K7RNS, 611 North Cottage Grove, Miles City, MT 59301.

KB8UUZ, from 40th annual Loyalty Day, Freedom Township, Ohio; Portage ARC; May 1–3 on 40 and 20 meter lower General band, Novice meters, and 6 meters. For 8.5 × 11 certificate send QSL and large SASE to: Tom Parkinson, KB8UUZ, 9992 State Route 700, Mantua, OH 44255.

KC8GXI, from Tyler County Historic Museum open house, Middlebourne, West Virginia; Tyler County AR Organization; 1400Z May 8 to 2200Z May 9; phone 3.860, 7.230, 14.270, 28.320. For certificate send QSL and 9 × 12 SASE to: TCARO, P.O. Box 287, Middlebourne, WV 26149.

K8TKA, from War Veteran Museum, Canfield, Ohio's Bicentennial; 20/9 ARC; 1300–2200Z May 25 on 40 meters phone 7.260 ±5 and 20 meters phone 14.275 ±5. For certificate send SASE and QSL to K8TKA, 2895 Penny Lane, Youngstown, Ohio 44515.

KI8CJ, from fourth anniversary of Parkwood Elementary School's fourth grade class Adopt-A-Ham, Beavercreek, Ohio; with Upper Valley ARC; beginning 2000Z May 1 for 24 hours on 145.11, 146.64, 146.94, 147.1337, 145.41. For QSL send QSL and SASE to Mike Fisher, KI8CJ, Parkwood Elementary Schools, 1791 Wilene Drive, Dayton, Ohio, 45432. Submit QSL request immediately after the event. Any requests received after June 1 will be held until school begins in the fall.

W8YAF, from Memorial Day Special Even, Yankee Air Museum, Willow Run Airport, Belleville, Michigan; 1200–2000Z May 25; SSB 7.270, 5 up or down. For certificate send QSL and 9 × 12 SASE to: N8BIB, Frank A Nagy, 24315 Waltz Rd., New Boston, MI 48164-9380.

W9V, from 45th anniversary of Cass County ARC, Logansport, Indiana; 1400–2100Z May 9 on 4.255, 14.282, 28.330, 146.520 ±20 kHz. For certificate or QSL send QSL to CCARC, P.O. Box 1092, Logansport, IN 46947.

W9DUA, from 10th anniversary of Illinois Vietnam Vets Memorial, Springfield, Illinois; Sagamon Valley RC; 1500Z May 16 to 2300Z May 17 on 7.240, 14.250, 21.350, 28.400 (within 20 kHz of these frequencies). For certificate send info and QSL to SVRC/Red Cross Bldg., 1025 S. Sixth, Springfield, IL 62703-2403.

W9S/W9IXG, from 150th anniversarey of Wisconsin statehood, Madison, Wisconsin; Four Lakes ARC; 1400–0200Z May 2–10; CW/SSB 25 kHz above lower General HF subbands; SSB 28325, 50.175, 144.225; FM 144.55. For certificate with WI sesquicentennial seal send $1 to UW Space Place, 1605 S. Park Street, Madison, WI 53715. For QSL send SASE.

AAØVM, from opening of Lake of the Ozarks Community Bridge, Missouri; Northside ARC; 1500–2300Z May 1–3 on 14.250, 21.350, 7.250, 28.350 voice. For certificate send 9 × 12 SASE to Northside ARC, P.O. Box 954, Rocky Mount, MO 65072.

KCØBEE, from Lincoln Highway Bridge Festival, Tama Iowa; Tama ARS; 1500–2300Z May 16; General 40–15 meters phone, Novice 10 meter phone, 2 meters. For certificate send QSL and 9 × 12 SASE to TARS/KCØBEE, P.O. Box 94, Montour, IA 50173.

TM6ACO, will be active from May 30 to June 7 (phone and CW), as every year. A new special QSL is sent to the contacts or SWL. QSL via F6KFI.

• The following hamfests, etc., are in May:

May 1–3, **International DX Convention**, Holiday Inn Visalia, Visalia, California. Contact Don Bostrom, 818-784-2590 (home), 310-334-8717 (work), or web site <www.primenet.com/~scdxc/dxconv98.html>.

May 2, **K4PGA Hamfest**, Fallsburg Community Center, Louisa, Kentucky. Contact Fred Jones, WA4SWF, 511 Lackey Ave., Louisa, KY 41230.

May 2, **Gastonia, NC Hamfest**, West Franklin Bingo Hall, Gastonia, North Carolina. Contact Lynn, 704-735-2197 or Milton 704-864-2456 (evenings).

May 2, **Wexaukee Hamfest**, Cadillac Middle School, Cadillac, Michigan. Contact Dan, KE8KU, 616-775-0998; e-mail: <ke8kudan@juno.com>. (Exams)

May 2, **Cochise County Hamfest**, Cochise College, Sierra Vista, Arizona. Contact Ron DeWillers, P.O. Box 1405, Sierra Vista, AZ 85636; or e-mail <d1234@sinosa.com>.

May 2, **Pikes Peak RA Assn. Swapfest**, Doherty High School, Colorado Springs, Colorado. Call Phil Pearsall, KC5LXC, 719-531-5319, e-mail <pearsall@msn.com>.

May 2, **Bankhead ARC Hamfest**, H.A. Alexander Park, Moulton, AL. Call Lee Creuzer, N8MHC, work 205-584-0111, home 205-35107916 or e-mail to <n8mhc@aol.com>. (Exams)

May 2, **6th Annual Owensboro, KY Hamfest**, Sportscenter, Owensboro, Kentucky. Contact George Stokes, KD4CKT, 502-683-2169, fax 502-684-2433 after 3 PM; e-mail <w4nho@occuky.campus.mci.net>. (Exams)

May 2, **SASRS 2nd Annual Tailgate Party**, Rosewood Farm, Elko, South Carolina. Contact Bill Wetzel, W4OXA, 803-245-5522; <wchapman@ scescape.net>.

May 2, **1998 Owego Hamfest**, Marvin Park Fairgrounds, Owego, New York. Contact BARA, P.O. Box 853, Binghamton, NY 13902; <owego98@ibm.net>.

May 2–3, **Key City ARC Hamfest**, Abilene Civic Center, Abilene, Texas. Contact Peg Richard, KA4UPA, 915-672-8889. (Exams)

May 3, **Ak-Sar-Ben ARC Ham Radio Auction**, Millard Social Hall, Omaha, Nebraska. Call Ed Edwards, KØIL, 402-552-5425; e-mail <k0usa@qsl. net>, <k0il@qsl.net>; or web site <http://www.qsl.net/k0usa>.

May 3, **DeKalb Hamfest**, Sandwich Fairgrounds, Sandwich, Illinois. Call Bob Yurs, W9ICU, 815-895-3310, e-mail <W9ICU@aol.com.>, packet N9VJQ@WB9SLE.IL.USA>; or website <http://tbcnet.com/~jleonard/hamfest.htm>.

May 3, **Metro 70cm Network Giant Electronic Fleamarket**, Lincoln High School, Yonkers, New York. Contact Otto J. Supliski, WB2SLQ, 914-969-1053. (Exams)

May 3, **Great Hagerstown Hamfest**, Hagerstown Junior College, Hagerstown, Maryland. Contact Don Jones, KB8WHW, 304-728-7769. (Exams 9 AM, contact KQ8E, 304-289-3576)

May 3, **Warminster ARC Hamfest**, Middletown Grange Fairgrounds, Wrightstown, Pennsylvania. Contact Tony Simek, N3YNH, 215-674-5218 (9 AM to 9 PM); e-mail <tsimek@aol.com>.

May 9, **Mancorad RC Hamfest & Computer Swapfest**, Manitowoc County Expo Center, Manitowoc, Wisconsin. Call Red 920-684-9097 days or Glenn 920-684-7096 day or evening. (Exams)

May 9, **Western Colorado ARC Hamfest & Computer Fair**, National Guard Armory, Grand Junction, Colorado. Contact Diana Dodd, KBØREW, 507 Liberty Cap Ct., Grand Jct., CO 81503. (Exams)

May 9, **Orange County Spring Hamfest**, John S. Burke Catholic High School, Goshen, New York. Contact Edward J. Moskowitz, N2XJI, 123 Harold Avenue, Cornwall, NY 12518 (914-534-3492). (Exams)

May 9, **Blue Ridge ARS Upstate SC Hamfest**, Anderson County Fairgrounds, Anderson, South Carolina. Contact Blue Ridge ARS, P.O. Box 6751, Greenville, SC 29606. (Exams)

May 15, **SW Ohio Chapter QCWA Annual Dayton Hamvention Banquet,** Friday evening, Alex's Continental Restaurant, Dayton Ohio. Tickets $15, reservation deadline May 13. Make checks payable to Robert L. Dingle, Treasurer Chapter 9, and mail to 117 Big Hill Road, Kettering, OH 45420-1201.

May 15–17, **Hamvention 98**, Hara Arena, Dayton, Ohio. Contact Hamvention, Box 964, Dayton, OH 45401-0964, or call 937-276-6930, fax 937-274-8369; e-mail <info@hamvention.org>; website <http://www.hamvention.org>.

May 16, **1st Annual Willmar, MN Hamfest & Electronics Swapmeet**, Sr. High School Cafeteria, Willmar, Minnesota.Contact Willmar Hamfest Committee, 209 Hawaii Street NE, Willmar, MN 56201; e-mail <wØsw@amsat.org>. (Exams)

May 16**, Rhode Island Annual 76 Spring Auction & Fleamarket**, VFW Post 6342, Forestdale, Rhode Island. Call Rick Fairweather, K1KYI, 401-725-7507, 7–8 PM.

May 22–23, **Jackson County ARC Hamfest 98**, Jackson County Fairgrounds, Pascagoula, Mississippi. Contact Charles "Kim" Kimmerly, N5XGI, at 228-826-5811. (Exams)

May 22–24, **Northern Alberta Biennial Hamfest**, Edmonton Inn Hotel, Edmonton, Alberta, Canada. Contact Ron Gordon, VE6RLG, <ve6rlg@narc.net>, or call 1-403-437-0579; web page <http://narc.tnc.com/~hamfest>.

May 23, **24th Annual Dur-Ham-Fest**, South Square Mall, Durham, North Carolina. Contact Rodney Draughon, AE4JW, 336-364-7420; e-mail: <ae4jw@juno.com>. (Exams)

May 24, **Chicago ARC Hamfest**, DeVry Institute of Technology, Chicago, Illinois. Call George 773-545-3622 or Dean 708-331-7764.

May 29–30, **1998 Midwest/Dakota Div. Convention with Hamboree 20**, Marina Inn, South Sioux City, Nebraska. Contact Mike Nickolaus, NFØN, 316 East 32nd Street, South Sioux City, NE 68776 (402-494-6070; e-mail: <nfØn@avalon.net>. (Exams)

May 29–31, **Rochester Hamfest**, Monroe County Fairgrounds, Rochester, New York. Contact Rochester Hamfest, 300 White Spruce Boulevard, Rochester, NY 14623, or call 716-424-7184, fax 716-424-7130; on the web <www.rochesterhamfest.org>; e-mail <rochfst@frontiernet.net>.

May 30, **Northern Colorado ARC Superfest**, Larimer County Fairgrounds, Loveland, Colorado. Contact Michael Robinson, N7MR, 970-282-1167. (Exams)

May 31, **North Hills RC Swapmeet**, Bella Vista High School, Fair Oaks, California. Call Bob Naylor, AC6HF, 916-966-3654; e-mail <ac6hf@juno.com>.

May 31, **Quebec Hamfest**, The Curling Club, Sorel-Tracy, Providence of Quebec, Canada. Contact Club Radioamateur Sorel-Tracy, Box 533, Sorel Quebec, Canada J3P 5N6, or e-mail <jgadoury@sorel-tracy.qc.ca>.

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OUR READERS SAY

A Possible Explanation

Editor, *CQ*:

I really enjoyed reading the article on 160 meter propagation in the March and April issues ("The 160 Meter Band: An Enigma Shrouded in a Mystery," by Cary Oler and Ted Cohen N4XX). It's given me one possible explanation for the repeated days of my hearing (and working) eastern Europe/western Asia when few others in the U.S. (including the east coast) appeared to be able to do so.

Bill Hohnstein, KØHA
Seward, NE

Getting A Handle

Editor, *CQ*:

[Re: "The 160 Meter Band: An Enigma Shrouded in a Mystery," Parts I and II, by Cary Oler and Ted Cohen, N4XX, March and April 1998 CQ]. Congratulations on an excellent piece of writing. At last someone seems to be getting a handle on the causes and effects. Would love it if you and Cary could do the same thing for the lower latitudes, Equatorial Anomaly, and so on.

We seem to have a blackout curtain which sometimes gets pulled down at the equator. People tell me that Topband propagation is difficult across the auroral zones. In the very short time I've been QRV on the band, however, I have seen many mornings when there have been plenty of transatlantic QSOs (even between high-latitude stations) reported on the Webcluster, and we haven't had a smell of anything. It seems particularly difficult to push RF into the Carib area, and I only have 8P and VP5 to date.

Cary has given me a couple of thoughts on this in the past, but as he says, there is still a long way to go. 73, and thanks again.

Greg Smith, ZS5K
New Germany, Rep. of South Africa

Many thanks for the nice comments, Greg. Well, when it comes to Topband, we're just learning to walk. I believe that Cary and I will do some kind of a follow-up article on Topband later in the year. Perhaps we can delve a little deeper into the kind of phenomena you observe. It's really interesting, though, isn't it? Have never (!) seen the kinds of propagation I observe on Topband in all my years on the air.—N4XX

It's A Beauty!

Editor, *CQ*:

I received the *CQ* First Place Rover plaque today! Boy, is it a beauty! Mine was sponsored by the Rochester VHF Group. I want to thank the group, *CQ* magazine, and Joe Lynch for making it happen! This award is especially dear to me because it was the last amateur radio activity that my dad (K8WKZ) and I participated in together. We traveled to northern Quebec in June, and he supplied the equipment for the Rover effort in July. He even had to run out to the first grid-square setup and deliver the forgotten bricks. Two weeks later dad lost his battle with cancer. The CQ VHF Contest was an event I'll never forget, and now I have a handsome token to remind me.

I share this first-place honor with N8PJP. Stan and I have worked other contests together, but while I napped, he kept on calling, "CQ Contest!" Even recently, while I've only gone out a few times in the last couple of years, Stan has kept the faith, kept on going, and even built a super trailer with extending masts!

Joe, if your sponsor list is not full for 1998's contest plaques, please send information on how the "Great Lakes VHF/UHF Newsletter" can sponsor a category plaque.

Dave Bostedor, Jr., N8NQS
Jackson, MI

GPS Warning

Editor, *CQ*:

I would like to pass along a warning to *everyone* who is now using or plans to become a GPS receiver owner. Did you know that the Global Positioning System is going to "rollover" at midnight August 21, 1999? It seems that the 13-bit proms (hardware) in the "Date value" portion of the GPS signal standard will overflow, causing the week number counter to reset from 1023 weeks to 0 weeks. It looks like this snafu is going to create some very real problems with affected equipment—problems such as in accurate time/date or incorrect positioning information!

What does this mean to folks who depend on the GPS for information? According to the U.S. Navy, that's *your* problem. If *your* receiver fails to work properly because *their* system will not be working as planned, too bad. Says the Navy: "Once the rollover has occurred, it is the responsibility of the *user* (i.e., user equipment or software) to account for the previous 1024 weeks. Depending upon the manufacturer of your GPS receiver, you may or may not be affected by the GPS Week Number Rollover on August 22, 1999. Some receivers may display inaccurate date information; some may also calculate incorrect navigation solutions."

Makes you wonder just how carefully the government plans for the future, doesn't it? With around 10,000,000 pieces of equipment (reasonable guess) already out there, things could get really interesting come August 1999.

Right *now* would be a real good time to find out if your current GPS receiver will be affected. If it will, then how do you go about getting it fixed (if you can)? I would also make certain that any newly purchased equipment includes a written, iron-clad, money-back guarantee that it will function properly after the "rollover." Last, I would make sure that I had an alternate way to "fix" my location. Anybody know where I can find classes on how to use a sextant?

Perhaps someone could look into this pending problem and report their findings to the readers. I think that most people would appreciate knowing more on this subject.

You can read it for yourself at <http://tycho.usno.navy.mil/gps_week.html>. More details? See <http://www.garynorth.com/y2k/search.cfm> category: Military.

Bob Snedeker, N2WRC
Trumansburg, NY

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Results of the 1997 CQ World-Wide WPX CW Contest

BY STEVE BOLIA*, N8BJQ

At last! The long awaited "next year" finally came, or as NJ3K said, "praying to the Sunspot Gods really helped." Twenty and 40 were hopping, and 15 opened nicely on Saturday. Even 10 meters showed some signs of life. Lots of folks had a much better time in 1997 than in recent years.

This is 40 meter QRP champ K2CS with his son Raymond. Raymond supplied half of the PC network. Anybody doing logging software for Raymond's laptop?

DX

Africa was again the favored location, with 3V8BB (YT1AD op.) edging out ZD8Z (N6TJ) for the SOAB title. Hrane worked the low bands (double QSO points) to his advantage, while Jim made the majority of his Q's on the high bands. Rain static and a two-hour power outage may have cost VP5GN a shot at number one. Dave did get a North American record, and the expedition trophy, for his fine efforts. Low power champion WP2Z operated by SM4CNN took fourth, followed by IZ9R from African Italy. USA champ N2NL was sixth, with KQ2M, VE3EJ, EU champion GIØKOW (GIØNWG op.), and OT7T (DL2CC op.) rounding out the top ten.

Ten meters must be centered on Malta. 9H1EL operating as 9HØA repeated as 10 meter champion. Low power champ LU9AUY was second, followed by LU3HIP, YU1CV, and 4X1VF. ZP5XF was the 15 meter winner, with 4X/OK1JR second, LP champion NP3A third, S5ØA fourth, and TU4FF fifth. ZF2NE led a contingent of Europeans on 20 meters. Second place went to HA3UU, with TK5NN third, OH5LF fourth, and OH1NOR fifth. LU1IV operated by LW9EUJ broke his 1996 record on his way to the 40 meter title. V26BA operated by N2BA was second with a North American record, followed by WP3CW, IR4T, and YT7A. 4O6A operated by YT6A just missed the EU record on 80 meters. Second-place finisher FM5BH did set a new North American record. S53R, 4N1A, and S55T rounded out the top five. SP5GRM came up a little short in his quest for the 160 meter record, but did get the EU record. S5ØU was close behind, followed by current record holder 4X4NJ, YU1EA, and OM5CD.

WP2Z was the low power champion, followed by J87GU (DL7VOG op.), GX4MBC, YU7CB, and USA champion WQ5L. S57J, K1HTV, WA1LNP, YN6WFM, and S51F finished sixth through tenth. LU9AUY was the 10 meter winner, followed by LU3HIP and YU1CV. NP3A edged out TU4FF for 15 meter honors, with L5ØV third. ED3ALN topped the 20 meter box, followed by 4N7B and 7M1MCT. XM7A (VE7SV op.) was the 40 meter winner, with RAØFW second and S54A third. HA8EU was the 80 meter champion, with YU1KR second and OM5KM third. Top band honors went to YU1RA, followed by UX2MF and RW4HHD.

*7354 Thackery Road, Springfield, OH 45502

W2GD at P4ØW demolished the 1991 QRP record. USA champion KR2Q finished second, followed by K1VUT, LY2FE, and VE3KP. LW3EBJ was the 10 meter QRP champion, Z32DR the 15 meter champ, and VE7SBO the 20 meter winner. K2CS took 40 meter honors, with SP4GFG the 80 meter champion, and S57M the top band winner.

CT3BX (YU1RL op.) was the Assisted champion, followed by DK3GI, USA champ WF3T, K3MM, and K3KO. S51AY was the 10 meter Assisted winner, IK3QAR the 15 meter champ, S5ØR the 20 meter leader, and 4O4C the 80 meter winner. In the low power Assisted category, S57XX edged out JK2VOC for the top spot. DJ6TK was the 10 meter champ, JR9NVB the 15 meter champion, EA7DPU the 20 meter winner, and YU1UA the top band champion.

The ops of NH2C relax with a cold one after the contest. Left to right are Toshi, WI3O; Aki, NH2C; and Kaz, N1BJ.

TROPHY WINNERS

SINGLE OPERATOR, ALL BAND

World: Steve Bolia, N8BJQ Award. Won by: **3V8BB operated by Hranislav Milosevic, YT1AD**.
USA: Steve Bolia, N8BJQ Award. Won by: **Dave Mueller, N2NL.**
Oceania: Tom Morton, KT6V Award. Won by: **Station KHØAA operated by Aki Nagi, KH7A.**
Canada: Radio Amateurs of Canada (RAC) Award. Won by: **John Sluymer, VE3EJ**.
Canada Low Power: Amateur Radio League of Alberta Award. Won by: **Vitaly Markhasin, VF6JO.**
Japan: The DX Family Foundation Award. Won By: **Satoshi Hara, JH5FXP**.
Europe: Ivo Pezer, 9A3A Award. Won by: **Station GIØKOW operated by A. R. Williamson, GIØNWG.**
USA QRP/p: Richard Arland, K7YHA Award. Won by: **Doug Zwiebel, KR2Q**.

SINGLE OPERATOR, SINGLE BAND

World: Pedro Piza Sr., KP4ES Memorial Award (Pedro Piza Jr., NP4A, donor). Won by: **LU1IV operated by Martin Monsalvo, LW9EUJ (7 MHz).**
World 7 MHz: William D. Johnson, KVØQ Award. Won by: **Brooke Allen, V26BA.**
World 3.5 MHz: Lance Johnson Digital Graphics Award. Won by: **Station 4Ø6A operated by Ranko Boca, YT6A.**
Oceania: D. Craig Boyer, AH9B Award. Won by: **D. F. Kiesewetter, VK2APK (14 MHz).**
USA: Kansas City DX Club Award. Won by: **Rick Davenport Jr., KI1G (14 MHz).**
USA 28 MHz: Bernie Welch, W8IMZ Memorial Award (Walt Smith, K1DWQ donor). Won by: **Station NN5AA operated by Richard King, K5NA.**
USA 21 MHz: Wayne Carroll, W4MPY Award. Won by: **Robert Patten, N4BP.**

MULTI-OPERATOR, SINGLE TRANSMITTER

World: Ron Blake, N4KE Award. Won by: **Station H22A operated by RA9JX, RA9JR, RZ9UA, RZ3BW & RA3CQ.**
USA: Austin Regal, N4WW Award. Won by: **Station NB1B operated by NB1B, W1KM, N1BB & W1FJ.**

MULTI-OPERATOR, MULTI-TRANSMITTER

World: Dick Frey, K4XU Award. Won by: **Station 9A1A operated by 9A5W, 9A2DQ, 9A3GW, 9A3NR, 9A6A, 9A6D, 9A2SD, 9A3SC, 9A2EU, 9A2R, 9A7R, 9A2B, 9A3ZA, S51R, S52OP & 9A9A**.
USA: Scott Robbins, W2DR & Doug Robbins, W4PA Award. Won by: **Station KG1D operated by KG1D, K1KI, K1PI & K1CC**.

CONTEST EXPEDITION

World: Ed Roller, K4IA Award. Won by: **Station VP5GN operated by David McCarty, K5GN.**

COMBINED SSB/CW

World: Al Slater, G3FXB Award. Won by: **Hranislav Milosevic, YT1AD.**
Europe: Les Nouvelles DX Group Award. Won by: **A. R. Williamson, GIØNWG.**
USA: D. Craig Boyer, AH9B Award. Won by: **Bob Shohet, KQ2M.**

CLUB (SSB & CW)

World: CQ Magazine Award. Won by: **Contest Club Finland.**
USA: Oklahoma DX Association Award. Won by: **Frankford Radio Club.**

The "new categories" are gaining in popularity and have proven to be a welcome addition to the WPX. 3V8BB repeated as the Tri-bander/Single Element winner. 3DA5A edged out S53AJK for second place, with G4ZEM fourth and 4N9BW fifth. The low power TS winner was YU7CB, followed by S51F, UA3ABJ, JA6UBK, and WK2G.

LY3JY was the top "Rookie" all bander, followed by TM6A and F5EJC. NP3A was not only the top "Rookie" entry on 15 meters, he was also the low power champion and third in the world overall. KGØUA was the top 20 meter "Rookie."

USA

In one of the closest finishes in years, N2NL and KQ2M battled it out for the USA championship. Both broke Dave's 1996 record and finished in a near dead heat. The margin of victory was about 75 QSO points with the mults being nearly equal. Third place went to Fred, K3ZO, with W4AN fourth and WR6AAA (N6IG op.) fifth. KT3Y took sixth, followed by W3PP, NY4A (K4VUD op.), K5YA, and AA3B. NN5AA (K5NA operating) was the US 10 meter champ, with AE4RO and WC4DX (W4YV op.) right on his heels. N4BP was the 15 meter winner, followed by W4WA and KN4Y. Twenty meters provided plenty of activity during the weekend as evidenced by the excellent US scores. KI1G finished number one, followed by K8DX, 1996 winner K8GL, and K2VV in Missouri. WA3KWU topped the 40 meter section, with W3BGN second and NA5B third. K4ZW was the big signal on 80 meters, with low power champ W1MK second and K2ONP third. On top band K1ZM braved the QRN to turn in a very nice score.

Ray, WQ5L, just edged out K1HTV and WA1LNP for the USA low power title. This was another very close race with less than 60K separating the top three. KN4Y was the 15 meter champ, with K2ACW second. WF1L took first on 20 meters, followed by K7ZA and K9AA. NM5NM (AA5B op.) won on 40 meters, with N2TN second and N2GM third. W1MK was the 80 meter champion and N6CMF the top band winner.

NY4A was the TS winner, with WC4E second and WV2LI (N2GA op.) third. WK2G was the low power TS winner, followed by NW6S and KV8Q. KE6QXJ was the top "Rookie" all bander, and KGØUA was the 20 meter "Rookie" winner.

WF3T was the US Assisted champion, followed by K3MM, K3KO, K4MA, and N5JR. KQ5DX (K5OT op.) topped the 20 meter category with N9GG second and NØAV third.

KR2Q took the USA QRP crown with K1VUT right on his heels. N1TM was third, KX1M (K1RC op.) fourth, and KA4RRU fifth. KY5N was the 10 meter champion, WA6FGV the 15 meter winner, and N7VY the 20 meter winner. K2CS was the 40 meter world champ and W7DRA the USA 80 meter QRP winner.

Multis

The gang at H22A came up just a bit short in their attempt at the world multi-single record, but did break the Asian record, on the way to the top spot in the world. Second place went to IH9/OK5DX, followed by JY9QJ, HG1S, and NH2C. EX9A finished sixth, followed by LZ9A, RK9CWW, EA3KU, and NB1B.

In the multi-multi class, perennial leader 9A1A beat HG73DX's 1993 record on the way to their title. Second place went to LY5A, with WL7E third, USA champ KG1D fourth, and S52ZW fifth. KH7R, S53M, EA4ML, PA6WPX, and 6V6U rounded out the top ten. 6V6U, WL7E, and KH7R all established new continental records.

The USA multi-single champion was NB1B, with NQ4I second, NJ4F third, KVØQ fourth, and KO7X fifth. The YCCC contingent at KG1D were the multi-multi champions, and new USA record holders. Second place went to K3EST, with N8NR third and W4MYA fourth.

The Rest of the Story

Each year we award three combined plaques to recognize the operators with the highest combined score for both modes. YT1AD was the winner of the World Combined plaque; A. R. Williamson, GIØNWG, was the European winner; and KQ2M was the USA champion.

The Contest Club Finland was the winner of the combined club championship. Finishing second in the world rankings was the Slovenia Contest Club. The Frankford Radio Club was the winner of the USA club award.

Unfortunately, two stations were disqualified this year for having an excessive amount of unverifiable contacts. Unverifiable contacts are busted call, miscopies, or typos. Our database folks (N6AA and N6TW) provide us with a detailed report of bad calls, uniques, and "not in log" calls. From these reports, we can get a handle on the overall accuracy of the operators. We had 460 logs and 493,000 Q's in the database for this contest. Over 37,000 calls appear, of which over 22,000 are unique QSOs.

Say You Saw It In CQ

This is the multi-single crew at OM5M. Standing are OM3BH on the left and OM6NM. In front are OM1KM and OM2RA. Not shown is OM2ZA. OM5M finished fifth in Europe.

To qualify for the DQ list (not the list you want to be on) requires an extremely high number of bad calls (not necessarily uniques).

Thanks again to N9AG, EA3DU, N6AA, N6TW, and F6JSZ for their help. EA3DU and F6JSZ act as collection points for logs in Europe. You may send your log to either the French or the Spanish *CQ* magazine offices instead of mailing them to the US. Starting in 1998, Ari, OH1EH, will be a collection point for OH logs.

There are no rule changes for the 1998 contest. **Beginning with the 1999 contest, the scoring will be changed to allow 1 point for in-country QSOs. That's one (1) point regardless of the band.** Please help to spread the word for 1999.

Thanks to those who actively support the WPX with special calls and expeditions. You help to keep the contest fun and interesting.

The 1998 CW contest will be held on 30 and 31 May, which is not a holiday weekend this time around. I'm looking for good conditions as the bands improve, and a record number of entries with no holiday. If you need log sheets, you can get them for an SASE from *CQ* in Hicksville. Please e-mail your logs to <N8BJQ @ERINET.COM.>. See you in the contest!

73, Steve, N8BJQ

Random Comments—USA

Three goals: (1) Work new countries (2) Make at least 100 QSOs, and (3) Have fun. All achieved. Was looking for JY and 3V; got 3V and BY. Close enough! . . . *AAØCY*. Should have spent more time on 40m. 2.71 points/q is low. . . . *AA4S*. Operating from Missouri sure is a humbling experience! . . . *K2VV*. Second time I have entered the WPX CW contest. Fun again! . . . *K4UK*. Band condx had to be good. Rotor was stuck

Here are Andy, K2LE, and Stan, EA6ZY, who seem very happy with their nearly 3000 Q effort as EA6ZY.

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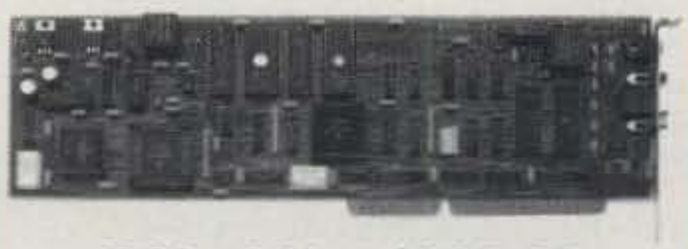

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CIRCLE 136 ON READER SERVICE CARD

WORLD TOP SCORES

SINGLE OPERATOR ALL BAND

3V8BB	**11,884,728**
ZD8Z	11,583,950
VP5GN	**10,675,330**
*WP2Z	7,907,666
IZ9R	7,435,560
N2NL	**7,032,033**
KQ2M	**6,964,656**
VE3EJ	**6,768,294**
GIØKOW	**6,325,953**
OT7T	6,242,748
7X2RO	6,059,438
K3ZO	5,670,060
W4AN	5,381,388
TM8R	5,354,440
OM8A	4,812,160
4NØAV	4,756,840
WR6AAA	4,625,448
DL6FBL	4,532,544
KT3Y	4,468,860
3DA5A	4,431,056
RN6BY	4,522,068
HZ1AB	4,475,488
S53AJK	4,405,313
EA2IA	4,320,945
JH5FXP	**4,236,044**

28 MHz

9HØA	590,914
*LU9AUY	192,780
*LU3HIP	183,954
*YU1CV	120,712
4X1VF	69,620
YT1W	50,949
*LR2DW	44,388
UR7VA	41,700
LZ6C	36,400
*S52OT	36,120

21 MHz

ZP5XF	5,023,872
4X/OK1JR	2,018,285
*NP3A	1,419,595
S50A	1,401,969
*TU4FF	1,341,472
S50C	1,045,476
*L50V	982,917
PU2MHB	945,906
EO6F	872,056
*CT1AOZ	756,792

14 MHz

ZF2NE	4,122,334
HA3UU	3,874,668
TK5NN	3,845,655
OH5LF	3,490,170
OH1NOR	3,481,896
OK1RF	3,433,254
HC2SL	3,415,258
KI1G	**3,326,930**
VE7SZ	3,324,843
YM2ZW	3,148,368

7 MHz

LU1IV	**7,671,456**
V26BA	**6,227,550**
WP3CW	5,158,240
IR4T	2,874,690
YT7A	2,653,028
TM4ZZ	2,428,160
YZ9M	2,343,132
*XM7A	2,141,034
US2YW	2,024,548
DL6RAI	1,989,750

3.5 MHz

4O6A	**919,620**
FM5BH	833,490
S53R	765,306
4N1A	736,906
S55T	571,560
YZ1AU	509,436
YQ2R	490,074
*HA8EU	442,800
LY1DD	431,460
IT9BLB	421,850

1.8 MHz

SP5GRM	249,516
S50U	223,200
4X4NJ	210,248
YU1EA	159,720
OM5CD	155,490
UUØJM	140,768
OL4U	129,592
*YU1RA	101,382
K1ZM	29,808
UX2MF	28,296

LOW POWER ALL BAND

WP2Z	7,907,666
J87GU	2,519,454
GX4MBC	1,951,264
YU7CB	1,857,905
WQ5L	1,754,004
S57J	1,751,221
K1HTV	1,699,896
WA1LNP	1,695,376
YN6WFM	1,641,915
S51F	1,565,388
G3XTT	1,558,339
IKØYVV	1,482,182
LU8HSO	1,396,380
VF6JO	**1,309,952**
SP2QCH	1,301,520
9V1ZB	1,283,814
VK2AYD	1,234,170
WO4O	1,216,800
SP9BBH	1,211,040
KC6CNV	1,168,384

28 MHz

LU9AUY	192,780
LU3HIP	183,954
YU1CV	120,712
LR2DW	44,388
S52OT	36,120
CT1ELP	17,472
DL7BY	12,740
OH3MEO	11,776
XE2AC	9,576
9A6KCL	8,541

21 MHz

NP3A	1,419,595
TU4FF	1,341,472
L50V	982,917
PU2MHB	945,906
CT1AOZ	756,792
IQ9AF	579,336
Z38G	441,408
UA4LM	329,238
Z31GB	314,592
YV4GLD	300,000

14 MHz

ED3ALN	2,252,050
4N7B	2,068,781
7M1MCT	1,756,656
UAØJQ	1,454,221
RO3A	1,438,906
HA8RH	1,419,872
JA7XBG	1,336,488
VK2APK	1,110,990
OK1FFU	1,087,310
RX9JN	1,079,891

7 MHz

XM7A	2,141,034
RAØFW	1,154,880
S54A	1,054,240
OK1XW	871,024
ON4RU	723,334
T94YT	679,228
RAØFA	657,199
NM5NM	574,544
HA3LN	514,752
YZ1V	503,608

3.5 MHz

HA8EU	442,800
YU1KR	368,184
OM5KM	329,840
S51W	211,584
SP5GH	203,688
YX1D	188,448
T93M	144,720
OL3Z	141,768
9A3QK	124,264
SP6EVX	120,958

1.8 MHz

YU1RA	101,382
UX2MF	28,296
RW4HHD	9,928
F5RZJ	6,018
N6CMF	260

TRIBANDER/ SINGLE ELEMENT

3V8BB	11,922,300
3DA5A	4,431,056
S53AJK	4,405,313
G3ZEM	4,106,520
4N9BW	4,090,215
7Z5OO	3,931,588
NY4A	3,866,037
TP9CE	3,249,624
4U1VIC	2,928,723
LY3MR	2,782,261
YL8M	2,677,536
LY6M	2,645,739
WC4E	2,342,480
DL9FBS	2,100,553
ES5MC	1,976,127
*YU7CB	1,857,905
WV2LI	1,797,450
IUØX	1,639,140
N6MU	1,583,088
*S51F	1,565,388

LOW POWER

YU7CB	1,857,905
S51F	1,565,388
UA3ABJ	1,138,606
JA6UBK	922,647
WK2G	835,992
OK2QX	808,974
NW6S	688,551
KV8Q	610,144
N2ED	561,005
EA5YU	484,416

BAND RESTRICTED

*OH3KCB	A	275,576
*LY3NJM	A	184,392
*OK2BUT	A	65,394
*JAØBMS/1	A	50,031
*FB1AVO	A	28,098
*EC3AHO	21	59,786

ROOKIE

*LY3JY	A	898,372
*TM5A	A	889,083
*F5EJC	A	486,239
*EA2CHI	A	148,208
*ON4CAS	A	59,817
*ON4CBW	A	29,040
KE6QXJ	A	14,812
*KE4OAR	A	1,235
*NP3A	21	1,419,595
KGØUA	14	138,744
*JD1BJT/M	14	16,254

QRP/p

P4ØW	A	4,018,208
KR2Q	**A**	**766,206**
K1VUT	A	735,100
LY2FE	A	683,337
VE3KP	A	557,577
LW3EBJ	28	17,892
KY5N	28	4,425
Z32DR	21	97,271
9A3GU	21	34,560
VE7SBO	14	466,474
YU1GN	14	245,079
K2CS	7	84,320
VE3SMA	7	59,160
SP4GFG	3.5	141,024
HAØGK	3.5	52,416
S57M	1.8	43,500

SINGLE OPERATOR ASSISTED

CT3BX	A	9,907,569
DK3GI	A	4,508,640
WF3T	A	4,147,848
K3MM	A	2,568,344
K3KO	A	2,012,516
K4MA	A	1,620,234
DL1MFL	A	1,417,167
N5JR	A	869,568
K3WW	A	816,007
AB2E	A	690,426
S51AY	28	100,580
IK3QAR	21	178,589
S50R	14	2,247,678
F5PGP	14	2,056,320
KQ5DX	14	1,143,136
N9GG	14	981,368
NØAV	14	767,611
4O4C	3.5	397,290

LOW POWER

S57XX	A	230,685
JK2VOC	A	171,380
JK1GKG	A	99,015
EA4AUF	A	43,125
EA3BHK	A	37,147
DJ6TK	28	1,400
JR9NVB	21	42,900
EA7DPU	14	762,440
JH3AIU	14	422,685
JE1XCZ	14	92,752
YU1UA	1.8	300

MULTI-OPERATOR SINGLE TRANSMITTER

H22A	**13,234,556**
IH9/OK5DX	10,780,258
JY9QJ	9,057,048
HG1S	7,575,594
NH2C	7,086,786
EX9A	6,777,604
LZ9A	6,317,454
RK9CWW	6,239,800
EA3KU	6,081,775
NB1B	**6,030,784**
9A7A	5,640,597
OM5M	5,553,056
RU6LWZ	5,201,496
EA6ZY	4,763,124
NQ4I	4,730,292
EA5BY	4,679,488
SL3ZV	4,571,244
NJ4F	4,520,334
JA5FDJ	4,458,507
VE7ZZZ	4,426,620

MULTI-OPERATOR MULTI-TRANSMITTER

9A1A	17,925,084
LY5A	13,786,112
WL7E	13,001,280
S52ZW	12,598,976
KG1D	**12,361,680**
RW2F	12,089,880
KH7R	11,760,354
S53M	11,138,904
EA4ML	10,700,800
PA6WPX	10,376,642
6V6U	9,938,896
OT7A	9,550,464
OH2HE	9,169,992
RW6AWT	8,085,592
OH1AF	8,080,333
K3EST	7,523,901
LY7A	7,493,904
N8NR	4,249,500
OZ5W	3,968,435
W4MYA	3,887,236

on Europe and still beat last year's score. Twenty meters was outstanding; a big thanks to the JA stations who worked me off the side of the beam. . . . *K5YAA.* Great conditions for first 24 hours. Europe coming in on 15m from 12Z Sat morning until past 0130Z. Sure wish the contest wasn't on a holiday weekend. . . .*K5ZD.*

Nothing broke (that's two in a row). . . . *K6GT.* Conditions good, WX lousy—rain, rain, rain. Nice to have contest over the Memorial Day this time. Had to stay home. . . .*K7ABV.* Thanks for the new categories. I think they will encourage more participation from the average-size stations. . . .*KB4GID.* Saturday was real nice. Great condx (considering) on 15m. It's the first EU's I've worked on 15m in awhile. Too bad the condx never made it to 10m. Twenty meters was real-money band, open quite nicely all night and late into the night. . . . *KC6X.* Only noise on 10 meters, 15 meters almost as bad, 80 meters too late for me. Sure wish the up cycle would begin. Never heard a discourteous person in the contest. Great going, guys and gals. . . . *KC7UP.*

Great test; 20 meters was great Saturday night. Finally worked Europe for WAC. . . . *KE6QXJ.* Forty meters was hot Sunday AM. Nice to hear short skip on 10 and 15. . . . *KMØL.* Had personal best despite only so-so conditions. . . . *KM2L.* Was going great guns until Mr. Flu Bug hit me after 7 hours. Spent the next 41 hours of the contest in bed. Next year! . . . *KN4T.* Newly retired, new QTH, new antenna, new tower, new personal high total. Great Saturday but noise and static from storm washed out Sunday. . . . *KN4Y.* I planned an assault on the US record and was

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*John Crovelli, P4ØW/W2GD is a regular among world top scorers. He and his **ALPHA 87A** S/N 001 won CQWWDXCW in '96 and took #3 SSB in '97*

	1996		1997	
	#1 World	#2 World	#1 World	#2 World
SSB	ZD8Z Alpha 87A	P4ØE Alpha 87A	ZD8Z Alpha 87A	EA8BH Alpha 87A
CW	P4ØW Alpha 87A	HC8N Alpha 78	P4ØE Alpha 87A	EA8EA Alpha 91B

Perennial winners EA8BH/OH2BH, P4ØE/CT1BOH and ZD8Z/N6TJ have appeared in previous ***ALPHA*** ads. 1997 claimed scores used.

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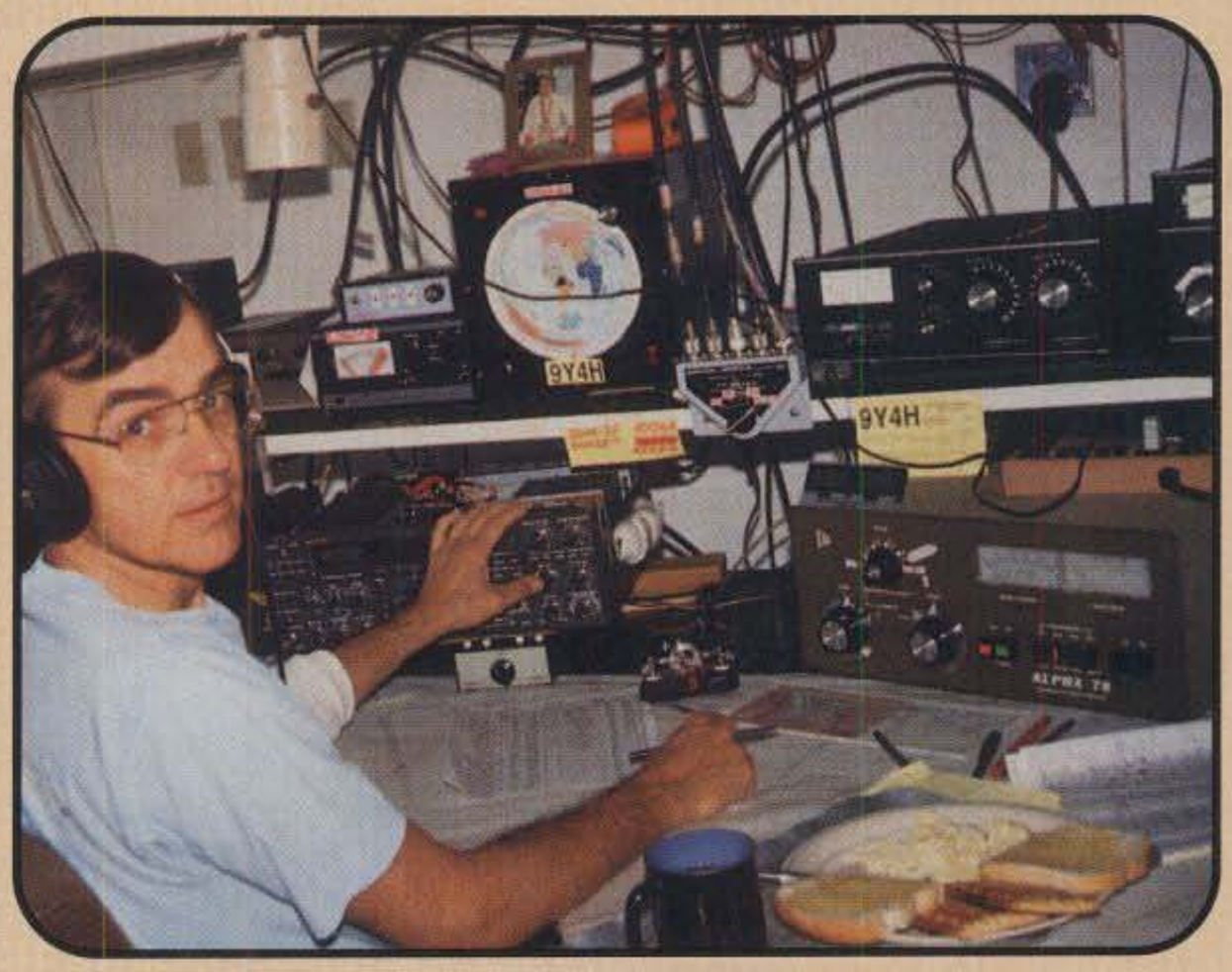
*"Hi Dick. Another victory for **ALPHA POWER** in 1997 CQWW CW Contest! Because of severe corrosion at P4ØE, I did the contest with a continuous feeling that something was going to break down. The only thing I knew for sure wouldn't break was the **ALPHA 87A**. And it didn't! We claim a new SA record 13.14Mpoints, very close to the world record 13.2M.*
—José, CT1BOH/P4ØE"



*Glenn Rattmann, K6NA (above) has owned **ALPHAs** for 25 years. In 1996 he took 9Y4H to the **world #4 SSB** with this classic **ALPHA 78**, and José, CT1BOH, took it to the **world #3 CW**.*

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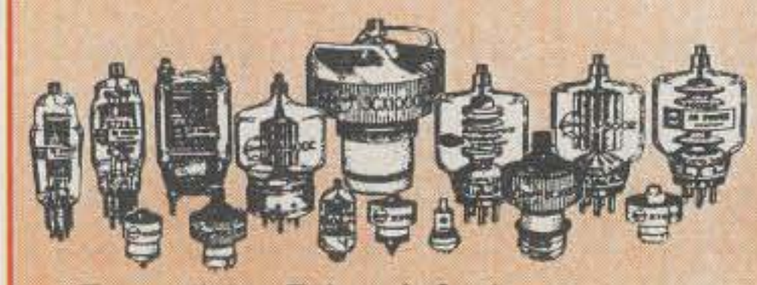

- Transmitting Tubes & Sockets
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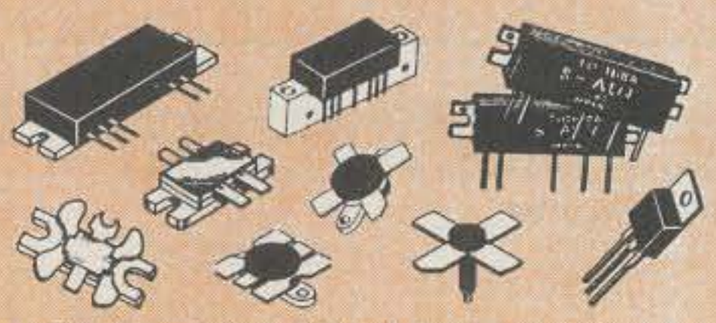

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KQ2M	**6,964,656**
K3ZO	5,670,060
W4AN	5,381,388
WR6AAA	4,625,448
KT3Y	4,468,860
W3PP	3,870,900
NY4A	3,866,037
K5YA	3,328,886
AA3B	3,267,290
K5ZD	3,129,345
N7DR	2,530,560
WC4E	2,342,480
K1AR	2,108,704
AA4S	1,857,900
WV2LI	1,797,450
*WQ5L	1,754,004
*K1HTV	1,699,896
*WA1LNP	1,695,376
K1VW	1,655,912
N6MU	1,583,088
KMØL	1,519,298
KW2J	1,437,132
KO7Z	1,419,086
K5YAA	1,328,338

28 MHz

NN5AA	**29,400**
AE4RO	27,552
WC4DX	23,125
NX5M	4,408
NA2X	2,912

21 MHz

N4BP	**572,139**
W4WA	307,518
*KN4Y	110,376
K9OM	109,510
AE4SW	96,672

14 MHz

KI1G	**3,326,930**
K8DX	2,673,125
K8GL	2,477,800
K2VV	2,461,342
WE9V	2,113,251
W9WI	1,393,938
WØTM	1,027,564
VE7UF/W7	851,808
K9NW	675,364
KM5G	658,939

7 MHz

WA3KWU	2,005,466
W3BGN	1,015,044
NA5B	772,200
*NM5NM	574,544
KØAV	423,384

3.5 MHz

K4ZW	301,910
*W1MK	82,038
K2ONP	45,756
K2YR	45,562
NT6K	19,635

1.8 MHz

K1ZM	29,808
*N6CMF	260

LOW POWER ALL BAND

WQ5L	1,754,004
K1HTV	1,699,896
WA1LNP	1,695,376
WO4O	1,216,800
KC6CNV	1,168,384
W7YAQ	1,092,599
WD5K	892,904
WK2G	835,992
WA3HAE	729,582
K1HT	723,387

21 MHz

KN4Y	110,376
K2ACW	27,921
NP4IW/WX6	9,486
K4WW	7,260
KU6T	7,055

14 MHz

WF1L	640,668
K7ZA	325,710
K9AA	244,818
NJ3K	208,152
N6RT	139,416

7 MHz

NM5NM	574,544
N2TN	327,888
N2GM	284,876
N4OT	238,140
W3CP	160,822

3.5 MHz

W1MK	82,038

1.8 MHz

N6CMF	260

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NY4A	3,866,037
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N6MU	1,583,088
KMØL	1,552,590
KW2J	1,437,132
KO7Z	1,419,086
W4AU	1,275,102
N3NT	1,104,490
KB4GID	1,103,520

LOW POWER

WK2G	835,992
NW6S	688,551
KV8Q	610,144
N2ED	561,005
WT8P	310,365
AB5SE	304,560
NA2Q	288,486
K4FPF	282,285
W7QN	278,640
KEØUI	205,632

ROOKIE

KE6QXJ	A	14,812
*KE4OAR	A	1,235
KGØUA	14	138,744

QRP/p

KR2Q	A	766,206
K1VUT	A	735,100
N1TM	A	519,248
KX1M	A	452,570
KA4RRU	A	422,484
KY5N	28	4,425
WA6FGV	21	7,663
N7VY	14	30,636
K2CS	7	84,320
KC8UR	7	44,100
W7DRA	3.5	748

ASSISTED

WF3T	A	4,147,848
K3MM	A	2,568,344
K3KO	A	2,012,516
K4MA	A	1,620,234
N5JR	A	869,568
K3WW	A	816,007
AB2E	A	690,426
N3ED	A	683,016
W6TKF	A	440,910
KQ5DX	14	1,143,136
N9GG	14	981,368
NØAV	14	767,611
K6CT	14	495,456
AC6DD	14	338,800

LOW POWER

*N1MD	A	7,038

MULTI-OPERATOR SINGLE TRANSMITTER

NB1B	**6,030,784**
NQ4I	4,730,292
NJ4F	4,520,334
KVØQ	4,333,931
KO7X	2,885,397
KC7V	2,857,232
NU4Y	2,639,426
KR5DX	2,025,660
NM6U	1,611,753
AC8W	844,160

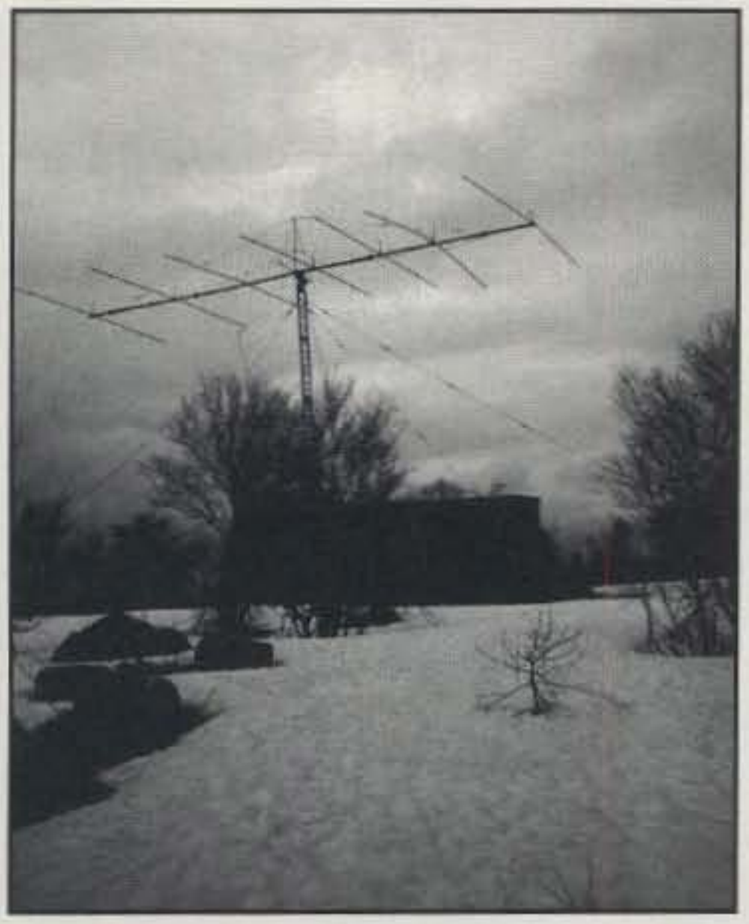
MULTI-OPERATOR MULTI-TRANSMITTER

KG1D	**12,361,680**
K3EST	7,523,901
N8NR	4,249,500
W4MYA	3,887,236

excited about being able to break it from western Mass. Was puzzled about struggling to work Europe on 15 and then became disappointed when I discovered that the good 15m propagation was for stations to the south and east of me. Special thanks to Dave, K1TTT, for the use of his station and his hospitality . . . . *KQ2M.*

The best contest in my year and a half on the air. Several new countries worked and more than just one of each for a change. Great fun. . . . *KQ6ES.* Forty meters was amazing!!! Kudos to all those who heard my peanut whistle. . . .*KV8Q.* Fantastic contest. Conditions were great here and Murphy stayed away a whole contest. . . . *KW2J.* This was my first serious CW-only effort in any contest. I need practice, but I really had a good time. Just don't like those abbreviated serial numbers. . . . *KW4T.* Another attempt at a 40m single band entry. Although I actually bagged more Q's this year, my score is much lower, due mostly to a reduction in early morning activity from JA. I only worked 26 JA's this year compared to 51 last year. . . . *KX7L.*

My signal kept stopping the clock in the computer logging program. . . . *N2OO.* Broke one million for the first time. . . . *N3NT.* Loooong opening to Europe on Saturday, almost none on Sunday. . . . *N4BP.* QSOs few and far between. Not a lot of players on 160. . . . *N6CMF.* What the heck was that H22A? . . . *N6HR.* It sounded as though the whole world was on 14 MHz during the evenings, but only two JA's heard (and



For most of us, the WPX is run in springtime weather. Not so for RW1ZA, who still had snow to shovel. That's a 7-element 20 meter beam above the shack.

worked) . . . *N8LM*. VF4 prefix used in remembrance of Red River Valley flood of 1997. Though the conditions on the 10m band were bad, I really enjoyed this contest. . . . *NA2Q*. Praying to the Sunspot Gods definitely helped. . . . *NJ3K*. It was fun to try out our new club callsign. Was also pleasantly surprised by how well I could run JA's with low power. . . . *NM5NM*.

A very enjoyable contest, and my best-ever effort in this one. The opening on 20m on Sunday morning was the best one I've seen in awhile, with the band open to the entire world at one time. I worked all continents in less than 15 minutes. . . . *NSØB*. Great to have 2x1 vanity call arrive three days before WPX! . . . *NT2W*. Had lots of fun here in NC using an 80 meter horizontal loop at 40 feet. . . . *NW6S*. New QTH at 9000 feet on mountaintop west of Vail. Still needed three more dB to break through east and west coast RF walls. . . . *WØTM*. Due to a little white ball, and turkeys, I was unable to make more than a token effort. Maybe next year. . . . *W3BGN*. I got to put in a full 24 hours this year for the tribander/single wire category. It was my best contest effort to date. Nothing spectacular to report, just kept plugging along. The TS category is a great incentive for me to try to do well against similarly equipped stations. Wish we had it in more contests. . . . *W4AU*.

Fun, as usual. Operation was from my vacation home in Pine Grove, CA, ele. 6700 feet. . . . *W6VNR*. First DX contest in 30-plus years. Between family obligations, working the weekend, and dumping my software once, I still had a ball. . . . *WAØFAX*. Just sorry that I couldn't spend more time. It was a blast! . . . *WA3HAE*. Operated from Ron Sigismonti's station N3RS. What a thrill! . . . *WA3KWU*. Very lazy operator, but band condx were not bad and as usual worked lots of JA's. . . . *WC7Q*. I always operate all the major CW DX contests, but this was my first WPX Contest in 20 years. Can't remember having this much fun since the Novice Roundups of the 1970s. Thanks for putting the spark back in contesting during the sunspot minimum. . . . *WD6DX*.

Great opening over the pole on 20m the first night! Wish I could have operated more. Best conditions in a long, long time. . . . *WRØA*. I am enjoying this contest more and more each year. . . . *WR1P*. Band conditions were good, but where were the G's and So. Am? . . . *WT8P*. My best results ever from this station. Thanks to all those who answered my calls. Friday night and Saturday were great. Can't wait until propagation really gets good. . . . *WV2LI*. Great contest! The west coast opening to Europe on Friday night helped me to increase my last year's score by 125%. See you again in '98. . . . *WX6V*. It sure is challeng-

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CLUB	SCORE	NR OF LOGS
Contest Club Finland	**82,194,303**	**27**
Slovenia Contest Club	70,105,346	60
Frankford Radio Club	**58,911,406**	**27**
YU DX Club	56,852,893	29
Araucaria DX Group	48,617,698	5
Rhein Ruhr DX Association	47,300,298	40
Yankee Clipper Contest Club	46,338,877	61
Potomac Valley Radio Club	45,365,757	51
Bavarian Contest Club	41,199,715	20
Marconi Contest Club	40,260,431	11
Northern California Contest Club	36,951,014	23
Les Nouvelles DX Group	31,399,343	28
Croatian CW Group	29,319,174	5
French Contest Club	27,085,362	15
Lithuanian DX Group	25,610,354	11
Kaunas Technology University Radio Club	20,267,455	23
Southern California Contest Club	19,094,169	14
Texas DX Society	18,950,848	8
HA DX Club	17,579,807	3
Lynx DX Group	17,216,476	6
South East Contest Club	14,614,667	11
9A CW Group	13,214,853	4
Low Land Crazy Contesters	13,212,339	5
Society of Midwest Contesters	11,436,101	19
North Coast Contesters	10,635,585	7
Puerto Rico Contest Club	9,504,455	3
North Texas Contest Club	9,419,597	17
Vojvodina Contest Club	9,185,047	7
Ukranian Contest Club	8,805,546	17
Western NY DX Association	7,819,217	4
Kiev Contest Group	7,656,318	5
SP Contest Club	6,597,466	12
Florida Contest Group	6,350,150	13
SouthWest Ohio DX Association	6,105,170	3
Macedonia Contest Team	5,913,829	7
SP DX Club	5,875,517	19
Western Siberia DX Club	5,803,877	3
Tennessee Contest Group	5,584,751	10
Carolina DX Association	5,550,450	4
Sao Paulo DX Group	5,291,631	13
Order of Boiled Owls	5,016,986	5
Kansas City DX Club	3,851,356	9
Fox Contest Club	3,351,389	10
Grand Mesa Contesters	3,106,474	5
Western Washington DX Club	3,081,198	9
Mississippi Valley DX/Contest Club	2,678,092	3
Chiltern DX Club	2,659,214	3
Koryzahma DX Company	2,657,570	8
San Diego DX Club	2,636,060	4
Willamette Valley DX Club	2,530,291	6
British Columbia DX Club	1,940,351	3
California Central Coast DX Club	1,567,830	3
Rochester DX Association	1,131,635	11
Boomer DX Club	1,110,669	3
URE	1,105,218	6
CTRI Contest Group	1,017,568	3
Salt City DX Association	1,001,691	4
Minnesota Wireless Association	933,180	3
Weekend Warriors	925,485	4
Union Francaise Des Telegraphistes	865,087	3
Kentucky Contest Group	593,245	4
Geo DX Group	545,075	3
Shizuoka DX Radio Association	496,898	4
Central Texas DX & Contest Club	436,356	3
Northrop Grumman Radio Club	431,096	4
French CQ Gang	278,445	3
South Jersey Radio Association	226,081	3
Northern California DX Club	192,364	3
West Park Radiops	70,718	3

ing to use a less than efficient antenna at QRP, especially for my first CW contest. . . . *AA8UP.*

My first WPX Contest. Great fun! . . . *AE4IC.* Forty meters was great! Five watts and a dipole can go a long way. . . . *K2CS.* Nice opening to south Europe/north Africa on 15m on Saturday. Worked 3V8BB with 5 watts! . . . *N7IR.* I got into this contest kinda on a whim. I told Danny, K7SS, that I was going to do an 80m QRP thing and he said, "Go for it" so I did. . . . *W7DRA.* After 8 years of contesting, this was my first with an electronic keyer, thanks to a gift from my friend, NØKE. It took a few hours just to get up to 20 wpm, but I'll never go back. Thanks, Phil! . . . *W8QZA/6.*

Random Comments—DX

Thank God for 15 meters! . . . *3B8/NK6F.* It may have been the last WPX CW from 3DA for me. Hoping to participate from somewhere in the world for '98. . . *.3DA5A.* Station manager OM1AM was a most gracious host. Murphy paid several unwelcome visits the first day. More congenial visitors dropped in the second. . . . *4U1ITU.* Great contest! The west coast opening to Europe on Friday night . . . *4X4NJ.* Great condx in the Sunday night. I could really enjoy the contest. . . *.7M1MCT.* As always excellent hearing by all USA operators in spite of troublesome conditions. . . . *9A2OO.* This was my first contest at my new station. I bought 50,000 sq ft land in an industrial park and put my company's new building on it. There will be another tower with another 3-ele quad in late summer. . . . *DL6FBL.*

It was my first contest . . . *FB1AVO.* At the risk of boring repetition, I think this is the best contest of the year with plenty to work at all times of the day and night. . . .*G3OOU.* Great fun. Propagation conditions ranging all the way from good through miserable! Thirty-six hours maximum for single ops looks about right for me, but maybe I'm just going soft? . . . *G3ZEM.* Bands overcrowded most of the time . . . *G4ZME.* I had quite a lot of dupes, don't think that people are yet aware of contest call in usage in Britain . . . *G7G.* Achieved my highest single op score to date, but this contest unfortunately clashes with my daughter's birthday celebrations. . . . *GW4BVJ.* Very interesting contest; unfortunately I have been QRV only 16 hours . . . . *HB9DCM.*

Nice contest but my R7000 was 20 cm above roof only and BIG local QRN by trams. . . . *HB9GCD.* This edition was unlucky for me. A lot of things had to be done, so WPX finished in second order—sigh. For the few hours I could enjoy, propagation was simply fantastic! . . . *IKØHBN.* After my WRTC96 experience, I never use more than 50 watts. It's really funny. . . . *IN3QBR.* This year I enjoyed WPX CW in a small tent on the top of the hill near my house to avoid TVI trouble. I was excited to be called by many EU stations continuously the second night. . . . *JH3AIU.* Good band condx helped me make my new record in this contest. . . . *JH4UYB.* Though the band condition on 10m band was bad, I really enjoyed this contest. . . . *JL1CVG.*

I had great time in Saipan, enjoyed very much with even a vertical on the roof top at the hotel. . . . *KHØAA.* Condx during the contest was very good on 40m and I was pleased to QSO many fine DX stations. . . . *LA7AK.* Ten meters was much better than last year. Nice openings to Europe and USA on Saturday. On Sunday the band opened at 1200 UTC. It's a long time I didn't see an opening this early. Ten is warming up. . . . *LU3HIP.* Great conditions on Saturday but slow going on Sunday. . . . *M7A.* Four hours of darkness per day this time of year in Alaska; very weak sigs from all but West Coast; no JA's on band strong enough to work! . . . *NL7Z.* My first single op contest. Thanks to KP3P and his wife for hosting me. . . . *NP3A.*

Propagation was good the first night. My total DX-percentage, 62%, was more than I expected. I guess it really pays off if you're able to beam into three different directions like it's possible at OH5LF's. I was able to maintain an average speed of >100 qsos/hour the first 10 hours. . . . *OH5LF.* Superb conditions, my best score in WPX so far. . . . *OH6AG.* Unfortunately I got very bad stomachache, headache, plus fever! I had to stop my contest during Sunday morning. Otherwise my result could reach Top Ten list, so next year I will try again! . . . *OH6XY.* My first WPX CW, and compete to get some new DXCC's. And I was lucky—got myself all band 32 new ones! . . . *ON4CBW.* First WPX. Best regards to all! . . . *ON6CW.*

I have very funny propagation to North America. I turn my 4-ele Yagi to Europe or North America or Africa or Australia, but every time have good signals from USA and North America. But I regret that North American stations not looking Asia on 10m. Please look to Asia, to RAØFF in WPX-98. . . . *RAØFF.* I love this contest. Good luck to everybody! . . . *RV6LFE.* Best wished from Russian Far East. . . . *RZØLWA.* A very nice contest. Good enough conditions to enjoy it. . . . *S5ØR.* Contest logging software for the first time in my ham career. Difficult to learn new things or change habits in age of 66 years. . . . *S52LL.* 80% of the score on 80m is done in about 15 hours. Gee, what was I doing for the rest of the contest? . . . *S53R.*

Sailed from Pascagoula USA to Immingham UK . . . . *SP1LJP/MM.* No good openings yet to NA. . . . *TU4FF.* Due to transceivers and power supply failures almost lost the first night of the best NA opening. No chance to compete for the "best EU" score afterwards. . . . *US5WE.* A power failure and setting two alarm clocks wrong messed up my off times! . . . *VE3EJ.* First semi-serious CW attempt. Thanks to those who returned my 20 wpm CQ's. Next year 30 wpm. . . . *VE3STT.* The best conditions I have seen on 20m for many years for this contest, and it's about time. Had a blast and blew my power supply. Used car battery outside of window on Sunday. . . . *VE6BMX.* Great again to be hearing signals on 20 meters day and night. . . . *VE7AV.*

VF4 prefix used in remembrance of Red River Valley flood of 1997. . . . *VF4YU.* Twenty-eight was interesting. There was a one hour slot each day into USA. Where were you guys? K3EST was my only 5 bander. Temporary dipoles for 40/80 were no good. I'll never learn. . . . *VK2AYD.* There were almost no signals above S9 the whole weekend. . . . *VK5GN.* Terrific conditions the first day, spoiled by rain static in the morning and a two-hour power outage in the afternoon. Had a great time anyway. . . . *VP5GN.* Lost amp after 4 hours; lost enthusiasm as a result. . . . *VS97BG.* This was my first serious contesting experience in almost 20 years. What a difference! Computer logging (Trlog), transceiver interface, automatic duping, a short attractive call, and a super QTH. Enjoyed every minute of the contest and a few days of vacation on St. Croix. . . . *WP2Z.*

This is Luis, HC2SL, the South American 14 MHz champion and a multiplier for most.

I used 50-100 watts of power and an old straight key Navy knob from WW II which belonged to my ex-Elmer, KP4NM, now a SK for three years, but his key is still active. I do it in his honor and memory. . . . *WP4LNQ*. Looked for KHØAA but no luck. Condx second day was totally poor. Happy to catch LY7A—a NEW one for me. . . . *YCØLOW*. This was very last time I will log manually. I need a computer! . . . *YU7WJ*. My first attempt at 40m CW from Macedonia. . . . *Z31GX*. Ham spirit lives in the Z3ØM contest group. Tnx to them for hospitality and possibility to compete. Everything was arranged—just sit in the ham shack and let key roll into the rhythm. . . . *Z38G*. Conditions were quite good. Activity seemed up from last year. Surprised that there weren't more African and South Pacific stations on the band. . . . *ZF2NE*.

We are happy for having been participated in this contest. . . . *CO9RCH*. The propagation on 20m and 15m was better than we expected and it was much fun to log in over 3000 QSO. But we were unable to break the Oceania record of M/S. Maybe next year we will be. . . . *NH2C*. Our first WPX multi-multi ever and our new QSO record! . . . *OH1AF*. After very little thinking we suddenly found ourselves unprepared in the middle of the very first multi-multi effort from OH2HE. And what a colorful and most educative weekend it turned out to be. . . . *OH2HE*. Soldering iron cold all 48 hours; that's new here! . . . *OZ5WQ*. Great contest, we enjoyed every minute of it. We broke our record again. . . . *PA6WPX*.

Conditions the first 12 hours were great. Then the minor storm sent ops to the napping mode. Between 1600Z the first day and 0300Z the second day, only 297 contacts were made. . . . *WL7E*. Had a great time for the time I could put in to the contest. Condx were super. . . . *G3LHJ*. It was great fun to see what is possible with just 5 watts. Greatest surprise was 3DA5A on 40m, who really heard me. . . . *OE2S*. Worked CE, LU, 6V6, and ZL on 40 meters with 5 watts and a vertical. . . . *SM3CCT*. It was my first contest . . . *SP5XSB*.

Station Operators Multi-Op Single Transmitter

4U1UN: W6TER & W2XX. **9AØC**: 9A2KL & 9A3TF. **9A5ØD**: 9A2FK, 9A3ID, 9A3NY, 9A3VM, 9A4PM, 9A4SG, 9A4VN, 9A6KKB, Mate. 9A7A: 9A7V, 9A8A, 9A2ME, 9A3OS, 9A3TR, 9A3QA, 9A4BT, 9A4RX. **9A9ØCBD**: 9A5CM, 9A4OZ, 9A5CY, 9A3LG, 9A3NM. **AC8W**: AC8W & K8DD. **DAØRG**: DL4ABR, DL4OCL, DL8OBC. **DFØDFA**: DL7UZO, DL7UVO, DL7VDX. **DKØTZ**: DL1SBF & DF5EN. **DK4WA**: DK4WA, DJ6TF, DJ7TO, DL6UST, DL7AKC, DL7URH. **DLØDX**: DK2OY & DL1QQ. **DLØKF**: HA1AG, LY1DC, DJ7SW, DK8LV, DF4PA. **EA3KU**: EA3KU & EA3AIR. **EA5BY**: EA5BY, EA5BXT, EA5EU, EA5FID, EA5FV, EA5GRV, EA5KW. **EA6ZY**: EA6ZY & K2LE. **EU5F**: EU6DX, EW6MM, EV6Z, EW6EW, EV6M. **EW35WB**: EU1AZ, EU1DX, EU1TU. **EX9A**: EX2M, EXØM, EX8W. **F5KAC**: F6JSZ & FB1IPH. **GX4CRC/P**: G4ODV. **H22A**: RA9JX, RA9JR, RZ9UA, RZ3BW, RA3CQ.

HA1KRR: HA1ZN, HA1ZY, HA1XU, HA1DC, HA1XQ, HA1DRR. **HG1S**: HA1TJ, HA1DAC, HA1AH, HA1AR, HA1DAE, HG1DAI. **IH9/OK5DX**: OK1CW, OK1FUA, OK1MO, OK1RR, OK1TN. **II1R**: IK1DPA, IK1CLP, IK1LWL, I1NVU, IK1QBT. **II2K**: IZ2AVK, IK2MMF, IK2BUF. **IO2L**: IZ2ACZ, IZ2AAJ, IK2PIG. **IQ2C**: IZ2ABW & IK2JUB. **JA2ZJW**: JH2CMI, JH2SON, JL2WNA. **JA5FDJ**: JA5FDJ, JA5JCC, JR5IAH. **JA7YAA**: JE1AMC, JF1SXL, JG7PSJ, JHØNZN, JRØSPG, T. Nakagawa. **JE2YHS**: JA2OLJ, JR2JVR, JG2NUD, JR2JPU. **JY9QJ**: LY9QJ, JY8YB. **KC7V**: KC7V, N7MB, N7ZE, N3NW. **KJØW**: KJØW, N5PJ, AB5I. **KO7X**: W7CT, NG7M, KO7X. **KR5DX**: K1OJ, W5MN, KM5AO, W5MJ, K5NZ. **KVØQ**: KTØF, WBØHBS, WX7K, KVØQ. **LG5LG**: LA4DCA & LA9HW. **LZ7N**: LZ1NG, LZ3DX, LZ3ND, LZ4IC, LZ5PW. **LZ9A**: LZ1UK, LZ2DF, LZ2EV, LZ2JE, LZ2PO, LZ2TX.

M7C: G3KKQ, G4TSH, GØAJM. **NØKE**: NØKE & KØCL. **N6HC**: N6HC & W1HIJ. **NB1B**: NB1B, W1KM, N1BB, W1FJ. **NC3DX**: N3UMA & WV3B. **NH2C**: JG3RPL, JI3ERV, JR7OMD. **NJ4F**: NJ4F, K7SV, K4GMH, K4EC, Daisy. **NM6U**: N6KI, WB6NBU, N6NC, N2UE, K6AM, KE6WEO. **NQ4I**: NQ4I, K4BAI, K4OGG. **NU4Y**: W4FDA, NU4Y, N4KE. **OF4AB**: OH4JFN, OH4KBC, OH4KEC, OH4YR. **OH2AAZ**: OH2BSI & OH2BSQ. **OH6RX**: OH6MMC, OH6OS, OH6RX. **OH7AAC**: OH6LNI, OH7MHL, OH7KD, OH7LTK, OH7WV. **OH8NW**: OH8WW & OH8MIZ. **OI1AY**: OH1JM & OH1MKT. **OK1KCF**: Club Group. **OL3A**: OK1AY, OK1CM, OK1MR. **OL5T**: OK1NR, OK1TC, OK1DNR, OK1FLM, OK1HSK. **OM3RKA**: OM5DP, OM5MZ, OM5NA, OM5TX, OM5TZ, OM5XX. **OM5M**: OM1KM, OM2RA, OM2ZA, OM3BH, OM6NM. **OM7F**: OM7PY, OM7JG, OM7PA, OM7IR, OM7ARI, OM7AMI, OM7ALC. **OM9A**: OM2DX, OM2ZZ, OM2TW, OM2AWW.

OZ5EDR: OZ1IVA, OZ5ABD, OZ5LH. **R3K**: RA3DUT, RZ3FA, RK3FA. **RK3AWE**: RU3DGD, RK3FT, RK3FM, RA3FF. **RK9CWW**: Igor S., Serge, Igor K., Mike. **RK9KWI**: UA9KJ & UA9KDZ. **RU6LWZ**: UA6LO, UA6LV, UA6LFQ, UR5MVZ, RA6LBX, UR5IBG. **RZ1AWD**: RV1CW, Vlad, Alexey. **S56M**: S56M, W6REC, S53G, S5ØQ. **SL3ZV**: SM3BDZ, SM3CVM, SM3JLA, SM3OJR, SMØTXT. **SP2PMO**: SP2FOV & SP2JKC. **SP9KRT**: SP9ADU, SP9ZW, SP9-1753. **VE6JY**: VE6BF, VE6FW, VE6EZ, VE6JY. **VE7UBC**: VE7WRA, VE7WNA, VE7TTQ, VE7CDL. **VE7ZZZ**: VE7DP, VE7QO, VE7SK, VE7RBL. **VK4EMM**: VK4EMM & VK4XY. **WA4FLZ**: WA4FLZ & K7UPJ. **YL1LGS**: YL2EO, YL3FW, YL3GD, YL2QL, YL2QQ. **YL1ZF**: KASPAR & ELMAR. **ZL1ANJ**: ZL1ANJ & ZL1/YU1UN.

Station Operators Multi-Op Multi-Transmitter

6V6U: K3IPK, 6W6JX, N3NS. **9A1A**: 9A5W, 9A2DQ, 9A3GW, 9A3NR, 9A6A, 9A6D, 9A2SD, 9A3SC, 9A2EU, 9A2R, 9A7R, 9A2B, 9A3ZA, S51R, S52OP, 9A9A. **CO9RCH**: CO6RD, CM6WD, CM6DW. **EA4ML**: EA4CJA, EA4MJ, EA4UA, EA4KA, EA4WN, EA4AKQ, EA4MC, EA4MS, EA4NN, EA7WA, EA4AKY, EA4ET, EA4TX, EA4AED, EA4AFD, EB4EPJ, EB4AKI, EC4AEG. **JA3ZOH**: JG3KIV, JI3OPA, JR4ISF. **JA7YFB**: JM1HBO & JL2OGZ. **K3EST**: K3EST, K2KW, W6RGG, KX7M, K6AW, AEØM, K6XX. **KG1D**: KG1D, K1KI, K1PI, K1CC. **KH7R**: KH6ND, AH6LV, NH6XO, WH6T, KH7U, WH6R, KH6U, K1ER, KH6HAT, KH6KX, KH6SX, KH6HKL, WH6XR, KH7R. **LY5A**: LY2BKW, LY2BTA, LY2IJ, LY2LA, LY2MW, LY2PX, LY2PAJ, LY3BY. **LY7A**: LYR346, LY2BMX, LY4AA, LY3DA, LY3MU, LY1EE, LY3OQ, LY2CU, LY2AO, LY1DI, LY2NK. **N8NR**: N9AG, N8NR, N8BJQ, W8QID.

OH1AF: OH1EH, OH1HEV, OH1HS, OH1LUZ, OH1NOA, OH1MDR, OH1XT. **OH2HE**: OH1JT, OH2BVI, OH2BZY, OH2HE, OH2IW, OH2JA, OH6CT, OH7BX, OH7JR. **OT7A**: ON1AWB, ON1CIM, ON1GL, ON4AEK, ON4ASW, ON4AUC, ON4CAF, ON4CCE, ON4DB, ON4FI, ON4MV, ON5OT, ON5SH, ON6ZX, ON6NL, ON7NB, ON7VP, PAØSOL, PA3EZL, PA3GIP, NX9O, W7VJ. **OZ5W**: OZ1FTE, OZ1FTU, OZ1KRF. OZ5WQ: OZ1BIZ, OZ3PE, OZ3ZW, OZ5WQ. **PA6WPX**: PA3CAL, PA3BBP, PA3BXC, PA3DMH, PA3ERC, PA3ERL, PA3EWP, PA3EYZ, PA3GBQ. **RW2F**: RA2FA, RA2FBC, RN2FA, UA2FB, UA2FC, UA2FF, UA2FJ, UA2FM, UA2FZ. **RW6AWT**: RN6BN, RN6MM, RA6YY, RA6AX, RX6BA, RK6BZ, UA6AAY, UA6NP. **S52ZW**: S52EZ, S52ZW, S53O, S57O, S58A, S58AB, S58AM, S59A, S59ZZ. **S53M**: S53ZO, S51OI, S51QA, S57C, S51ZO, S51RJ, S57AD, S57NX. **W4MYA**: WA4DAI, WA4QDM, N4EHJ, W4MYA. **WL7E**: WL7E, KL7Y, KL7PJ, KL2A, KØMVL, KL7XX.

(Scores on page 96)

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- 208 Memory Channels
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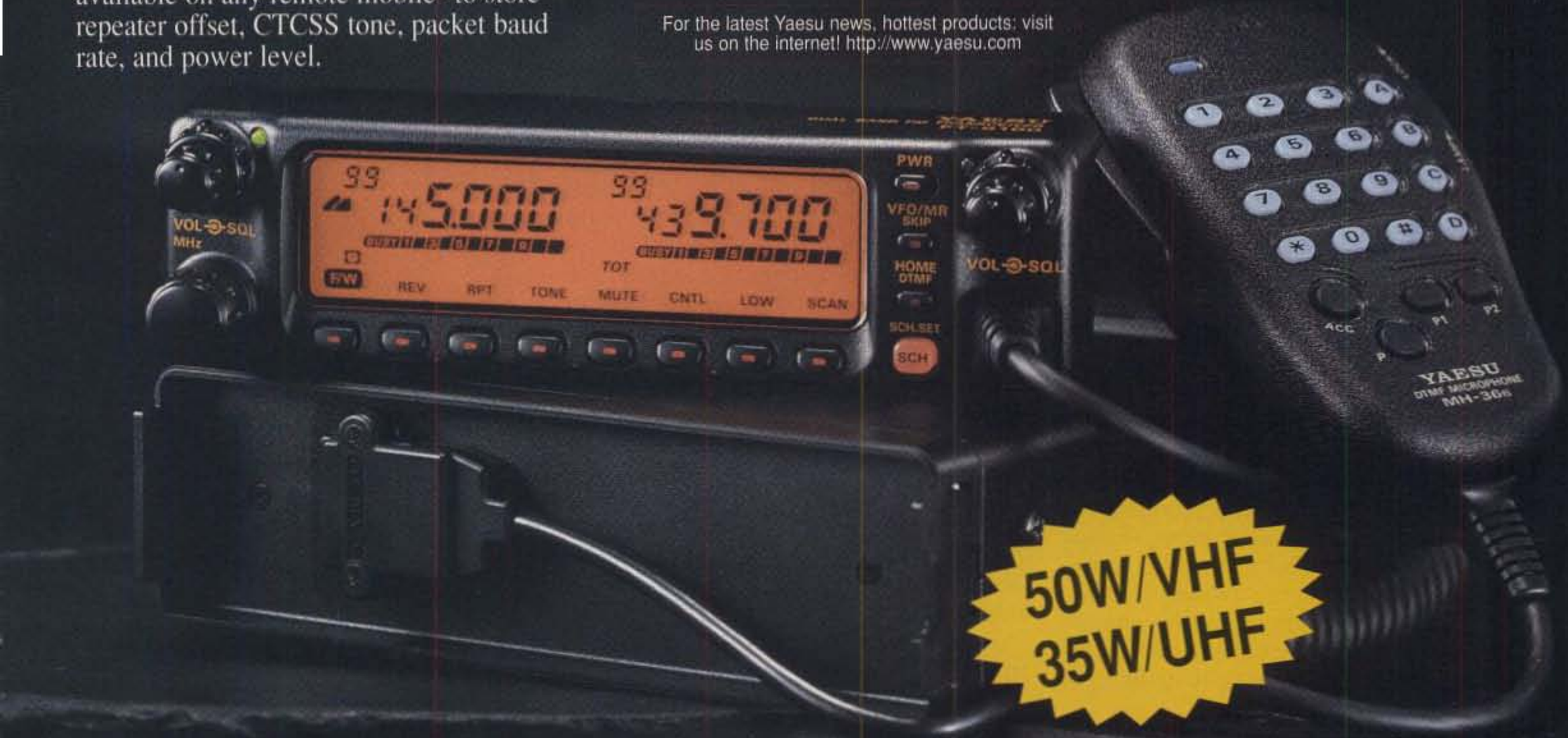

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There are some things in amateur radio that we just take for granted. They're so close, so obvious, that we cease to see them as breakthroughs, nor do we think about who could have set out to invent them. Harry Rubinstein is a name you may not have heard of before, but you probably use his inventions every day of your life.

Harry W. Rubinstein, ex-9EEV (SK)
Inventor of the Printed Circuit

BY DR. THEODORE J. (Ted) Cohen*, N4XX

We owe a great debt of gratitude to those experimenters who came before us. Collectively, their inventions and contributions make amateur radio one of the most technically sophisticated, wireless, people-to-people communications services available today. But it wasn't always like that. In the early years of radio, and continuing through WW II, the potential that lay within the medium known as "radio" was only beginning to be tapped. One of those experimenters who "pushed" the state-of-the-art at every turn was Harry Rubinstein. It is with great pleasure, then, that we present the story of his life and of some of his many inventions, some of which we all use every day of our lives. The information presented here not only is based on the archival literature, but also on Ted Cohen's many discussions with Harry, his uncle, discussions that date from the early 1950s until Harry's death at the age of 85 in August 1990.

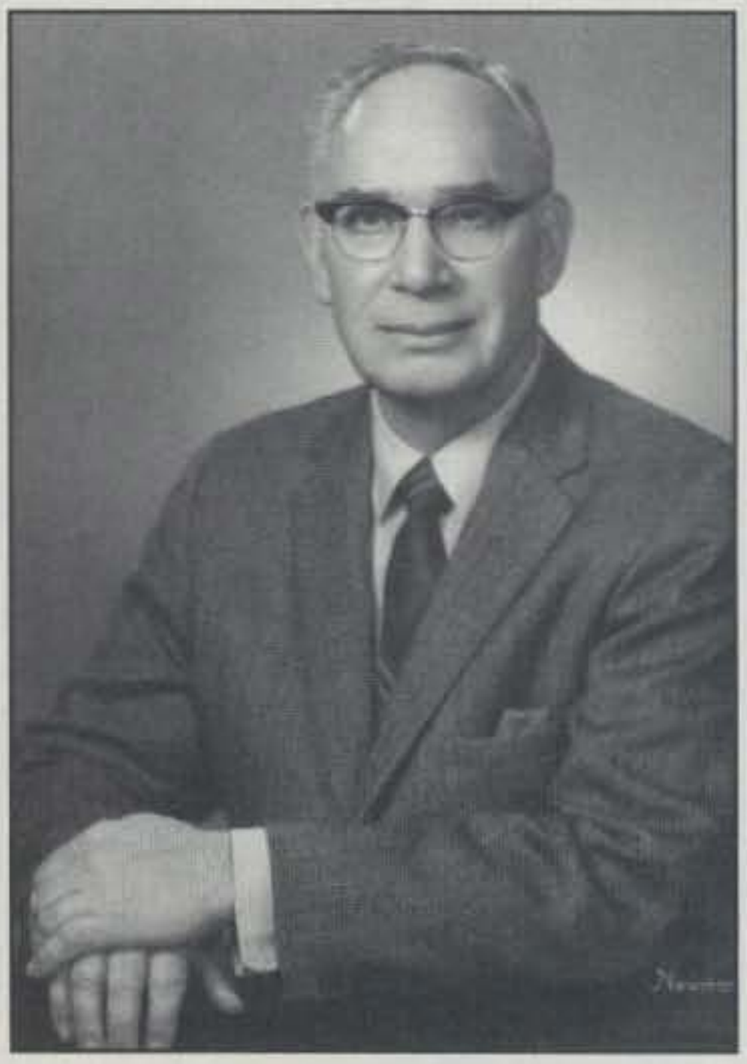
—K2EEK

Harry W. Rubinstein was born in Phillips, Wisconsin in 1905. The second oldest of five children, he showed an early interest in the new science of radio, and it was only a matter of time before he put his own amateur station on the air in the early 1920s. The Department of Commerce's call directory for 1925 (Ref. 1), for example, shows the callsign "9EEV" assigned to Harry Rubinstein, with station power listed as 5 watts.

Given Harry's intense interest in electronics, it was only natural that he attended the University of Wisconsin in Madison to obtain a BSEE. To help pay for his college education, Harry worked summers as radio operator on ships that plied Lake Michigan. He graduated in 1927, and immediately took a job with Centralab Electronics Division (CRL), a division of Globe Union, Inc. (now Johnson Controls, Inc.) in Milwaukee, Wisconsin. There he rapidly rose to the position of Chief Engineer. It was as an employee of CRL that he invented devices such as the combined on-off/volume control switch for radios as well as the slide volume control. These were among the first of 20 patents Harry received during his lifetime.

Using Harry's patents (which he assigned to them), CRL produced tone and volume controls for radio receivers. The controls essentially employed a carbon-filled paste that was screen printed on a substrate; the paste, once dried, provided the resistive element for the control of tone or volume. (Ref. 2, p. 5) Harry also was very familiar with the use of screened silver, because CRL was producing mica capacitor electrodes using this technique (as opposed to the old technique of spraying silver oxide on a mica). He learned the art of using screened silver for making capacitors when the U.S. government required the Erie Resistor Company, which held the patents for making "button" mica capacitors, to establish a second source for their capacitors. Eire chose CRL, and Harry, as Chief Engineer at CRL, was responsible for the effort.

Now in place were all of the elements that would lead to one of the most important inventions of the 20th century—the invention of the printed circuit.



Harry W. Rubinstein, ex-9EEV (1905-1990), inventor of the Printed Circuit. (Photo courtesy Mrs. Else Rubinstein)

Invention of the Printed Circuit

Prior to the entry of the United States into WW II, the National Defense Research Committee (NDRC) undertook the development of proximity fuses for bombs, rockets, and mortar shells. The Centralab Electronics Division of Globe Union was one supplier of such fuses to the Army and Navy. But by early 1944, at a time when the U.S. was contemplating the invasion of Japan, the demand for smaller and smaller fuses (driven by the increasingly small size of nonrotating radio fuses for trench mortars [Ref. 2, p. 6]) imposed almost impossible constraints on the dimensions for these devices. In fact, Harry Diamond of the National Bureau of Standards wanted a fuze developed for the 81 mm mortar shell that was one-third

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Power Curve -- typical BD-35 output power							
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Watts Out (440 MHz)	16	26	32	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7

Add this Mirage dual band amp and boost your handheld to 45 watts on 2 Meters or 35 watts on 440 MHz!

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- ***Custom wrap-around heatsink*** -- runs cool
- ***Reverse Polarity Protection*** -- saves your amp if you connect power backward
- ***Automatic RF sense Transmit/Receive switch*** -- makes operation easy
- ***Low input SWR*** -- keeps your handheld safe from overheating
- ***"On Air" LEDs*** -- for each band
- ***Free mobile mounting bracket***
- ***Free 3 foot handheld-to-BD-35 coax cable***
- ***Small size:*** just 5x1¾x5 inches
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35 Watts for 2 Meter HTs

B-34-G
$89.95
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Power Curve -- typical B-34-G output power								
Watts Out	18	30	33	35+	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7	8

- ***35 Watts Output on 2 Meters***
- ***All modes: FM, SSB, CW***
- ***18 dB GaAsFET preamp***
- ***Reverse polarity protection***
- ***Includes mobile bracket***
- ***Auto RF sense T/R switch***
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MIRAGE RUGGED!

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B-34, $69.95. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

160 Watts on 2 Meters!

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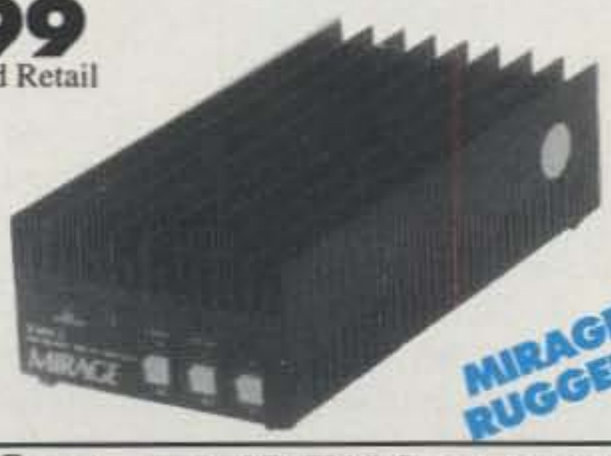

MIRAGE RUGGED!

Power Curve -- typical B-5016-G output power								
Watts Out	130	135	140	145	150	155	160	165
Watts In	20	25	30	35	40	45	50	55

The MIRAGE B-5016-G gives you 160 watts of brute power for 50 watts input on all modes -- FM, SSB or CW!

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B-215-G, $379. MIRAGE's most popular *handheld* amp. 150 watts out/2 watts in; 160 watts out/3½ W in. For 0.25 to 5 watt handhelds.

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Rubinstein as a radio operator aboard the Carolina (ca. 1925). (Photo courtesy Mrs. Myrtle Rubinstein Cohen)

the size of those used in larger munitions such as bombs.

By that time, clock mechanisms not only were too big for the job, but they were not good enough. And because the fuses then built had to be hand-wired, production rates were woefully low. Diamond called upon Jacob Rabinow (a prolific inventor in his own right) to lead the development effort that would result in a small, dependable fuze for the 81 mm mortar. He also called Rubinstein to Washington, asking him to bring a contingent of engineers with him. In May 1944 Rubinstein arrived in Washington with Herbert L. White (ME), Edwin T. Sherwood (EE), George M. Ehlers (ChemE), and J. F. Harper (VP Engineering). (Ref. 2, p. 6)

At the NBS, Diamond briefed Rubinstein's group. And while they didn't understand all of the material that was presented to them, they certainly grasped the nature and significance of the problem. After many hours with the NBS personnel, Rubinstein's group retired to their hotel. They worked late into the night, but by the time they went to bed, they did not have even an inkling as to how to solve the problem of how to develop a small, dependable fuze. (Ref. 3)

The following morning Rubinstein suddenly had an idea. He asked for a copy of the circuit diagram his group was to address. Security considerations prevented Diamond from giving Rubinstein the schematic, but he did allow Rabinow to sketch portions of the circuit that involved the use of passive components. What follows below was recorded by Cadenhead and DeCoursey in their 1984 interview with Rubinstein. It is included here, word for word, because of the far-reaching implications Rubinstein's work was to have on the entire field of electronics.

"Rubinstein suggested they start with either a steatite or titanate plate and use silver patterns in place of copper wires for conductors. 'Where resistors are needed,' Rubinstein said, 'we will screen on resisters.' For capacitors the group suggested discs with silver electrodes so they could be soldered on their bottom side to the substrate and connected from the topside with a pigtail lead. **This was the first time Centralab (or anyone else) had even considered the solid state integration of passive circuit elements; and, in fact, their results were the first of its kind thick film microelectronic circuitry . . .** " (emphasis added; Ref. 2, p. 6)

The suggestions of Rubinstein and his group were immediately embraced by Diamond and his staff at NBS, and they urged the CRL personnel to develop a prototype device as soon as possible. This they did, and within a week Rubinstein returned to Washington with two prototypes: One used steatite as a base and the other used titanate. He gave the printed circuits to Rabinow, who immediately added the missing components and tested the devices (remember, Rubinstein's group was not allowed to take a complete schematic with them). According to conversations with Rubinstein (personal communications), only the circuit that used steatite worked. This is confirmed by Cadenhead and DeCoursey (Ref. 2, p. 7), who remarked that Rubinstein heard Rabinow shout as he came out of his laboratory: "It works! It works!" Rabinow then directed Rubinstein to return to Milwaukee and perfect the steatite-based circuit. This circuit, once perfected, became the prototype for fuses that CRL, using the facilities of the South Lowell, Massachusetts, ordnance depot, turned out at the rate of 100,000 per month.

The Post-War Years

In 1946 Rubinstein and two colleagues left Globe Union and formed Herlec, Inc., which specialized in manufacturing ceramic capacitors. Sprague Electric subsequently purchased Herlec in 1948 and retained Rubinstein to run their Grafton, Wisconsin factory. It became the most profitable cost center in the entire corporation. According to his granddaughter, Marge Rubinstein Eiseman, he instinctively knew how to do many things, a capability that led to a saying at Sprague that "[T]here's a right way, a wrong way, and Harry's way" for getting things done! (personal communication)

Forced into retirement in 1971 at age 65, Rubinstein continued to tinker with electrical and mechanical devices. He was an avid collector and restorer of French carriage clocks and maintained an active correspondence on the subject of complex locks with his old friend Jacob Rabinow. He again became a serious (and successful) student of the stock market, an area in which he had an intense interest throughout his life. He also liked to fish, make jewelry, play bridge and the piano, and travel. Even when a stroke in 1983 left him paralyzed on the right side, Rubinstein continued to create devices of one sort or another. Unable to open and close a sliding glass door to his bedroom, for example, he designed and built a remote-controlled device to do the job.

It was through the untiring efforts of his friend and fellow inventor Jacob Rabinow that Rubinstein was nominated for the prestigious Cledo Brunetti Award by the Institute of Electrical and Electronics Engineers (IEEE) for his invention of the printed circuit. After much research, the Institute agreed that indeed, Rubinstein was the inventor. The award, which was officially announced in February 1984, was for his lifetime "outstanding contributions in the field of miniaturization in electronic arts" and specifically, for his invention of the printed circuit. Despite having suffered a stroke in early 1983, Rubinstein traveled to California later in 1984 with his wife, Else, to accept the award and to receive a standing ovation from 3100 engineers at the IEEE's annual convention.

Epilog

Rubinstein never benefitted financially from his invention of the printed circuit. Because his invention, made during wartime, was considered so important to the war effort, he was not permitted to file a patent application for over 20 years. And even when he did file, the patent had to be assigned to Globe Union. For his invention of the printed circuit, and in line with business practices found even today in the United States and elsewhere, Globe Union paid Harry Rubinstein $10. ■

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2. Cadenhead, Roger L. and Donald T. DeCoursey, "The History of Microelectronics—Part One," *International Journal for Hybrid Microelectronics,* Vol. 8, No. 3, September 1985.

3. Greene, Laura, *Computer Pioneers,* Franklin Watts, New York, 1985, p. 56–59.

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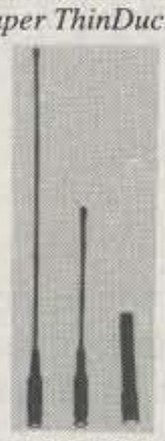

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The Tuppenny Paddle

Build an Iambic Paddle for Two Cents!

BY GEORGE MURPHY*, VE3ERP

I am sick and tired of cheap braggarts telling me how their latest homebrew project "didn't cost me a cent." A cursory glance at the plans for *this* project will prove that no matter how you cut it, this paddle will cost at least two cents. The Tuppenny Paddle has all the features of commercial paddles, and if you will permit a bit of braggadocio, it didn't cost me a cent. The two pennies came from my XYL's piggy bank, but she will never know unless she pulls a surprise audit.

All you will need to build the Tuppenny Paddle are two pennies, a spring clothespin, a discarded ballpoint pen, some scrap bits of wood, and a few nuts, bolts, and washers.

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Preparation

The secret of success in amateur gear homebrewing and brain surgery is proper

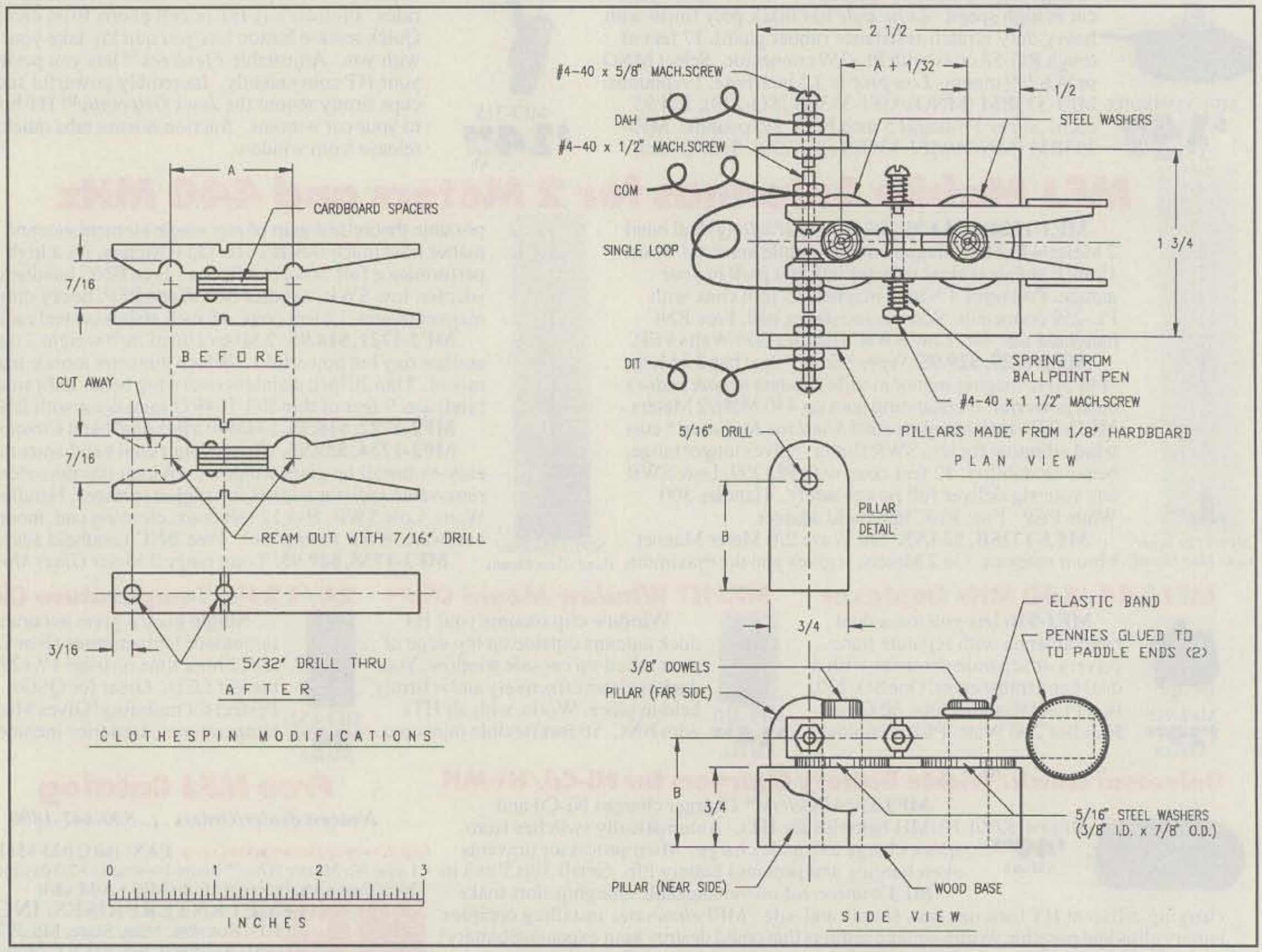

Fig. 1– Mechanical diagram for the Tuppenny Paddle. (All dimensions shown are in inches.)

preparation. With the skill and dexterity of a brain surgeon, disassemble a spring clothespin by removing the spring. Cut a few pieces of cardboard to make a laminated spacer, as shown in the "before" drawing (use as many laminations as required to achieve the 7/16 inch spacing shown between the jaw grooves). Glue the cardboard pieces and the two clothespin pieces together and clamp the assembly until the glue is dry. Measure distance "A" shown on the "before" drawing and make a note of it for later use. The purpose of all this gluing is to keep bits and pieces from squirting all over the place during the next operation.

While the assembly is still clamped, carefully ream out the grooves with a 7/16 inch bit in a hand drill, or in a power drill at its slowest speed. Cut away the jaws as shown with a sharp knife. Remove the assembly from the clamp and drill 5/32 inch holes through the wood pieces; then cut away the cardboard spacers. If you are the fussy type, you can sand and paint the two wood pieces. If you intend to operate your rig while scuba diving, then use marine varnish.

The base is a piece of 1×2 lumber 45 mm (1 3/4 inches) long. Drill two 3/8 inch holes located as shown on the plan view. Note that the spacing between the holes is 1/32 inch greater than dimension "A." This is to make sure there will be no binding of the moving parts. If at all possible, drill the holes in a drill press to ensure the dowels will sit up nice and straight in the wood base.

Make two pillars out of scrap hardboard or rigid plastic. Dimension "B" can be determined from a preliminary assembly of parts as shown in the side view. Cut two pieces about 35 mm (1 3/8 inch) long from a length of 3/8 inch diameter dowel.

Glue the pennies to the paddle ends with epoxy glue, and the tricky stuff is finished. Once epoxy glue sets, there is no turning back. Whether to glue the pennies both heads facing out, both tails facing out, head to head, or tail to tail is a tough decision you must face alone. If you can't handle it, ask for help on the Internet.

Assembly

Glue the two dowels into the base. Install all the screws, nuts, and washers as shown in the drawing. Cut the spring from a ballpoint pen in half to make the two springs required. Drop 5/16 inch steel washers (they have 3/8 inch holes!) over the dowels and sit the spring-loaded paddle on top of them. If the paddle tends to "walk" up the pivot dowel when in use, a small elastic band twisted two or three times around the dowel above the paddle will hold it down. Glue or screw the pillars in place, lining up their contact screws with the matching screws in the paddle arms. Connect the small-gauge stranded-wire leads and you are done.

Adjustment

The stroke (travel) of each arm is adjusted by the screws in each pillar. The easiest way to set the gap is by using a spark plug feeler gauge or a piece of thin cardboard. The resistive "feel" of the paddles is adjusted by the nut on the screw holding the springs. Since the spring assembly is free-floating, the pressure is the same on each arm, even if the two springs are not exactly identical. No lubrication is required at the pivot dowel because the arms do not rotate about the dowel; they just sort of see-saw at the point of contact. This is because the radius of the grooves in the arms is greater than the radius of the pivot dowel.

Frills and Fripperies

You may want to add a weighted base, mounting holes, or a leg strap for mobile use. I just stick my Tuppenny Paddle to everything with double-sided adhesive tape. A nice finishing touch would be proper binding posts for the wires. For a Super-Deluxe version you could even glue a dime on top of each dowel.

And Finally . . .

Remember the clothespin spring? Don't throw it away. According to my HAMCALC computer software, it has an inductance of 14.739 nH, which, paralleled with an 82.88 pF capacitor, resonates at 144.000 MHz. Keep the spring in the same parts bin as your 82.88 pF capacitors in case some day you need a 2 meter trap for a VHF trap dipole. Send me $5.00 and I will send you a free copy of HAMCALC version 32, a 3 1/2 inch DOS/Windows diskette containing more than 200 programs for amateur and professional radio buffs. ■

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Sometimes a great notion. If your station is comprised of ICOM gear, here's a device you can build for it that will create an automatic antenna switch.

How To Build An Automatic Antenna Switch For ICOM Transceivers

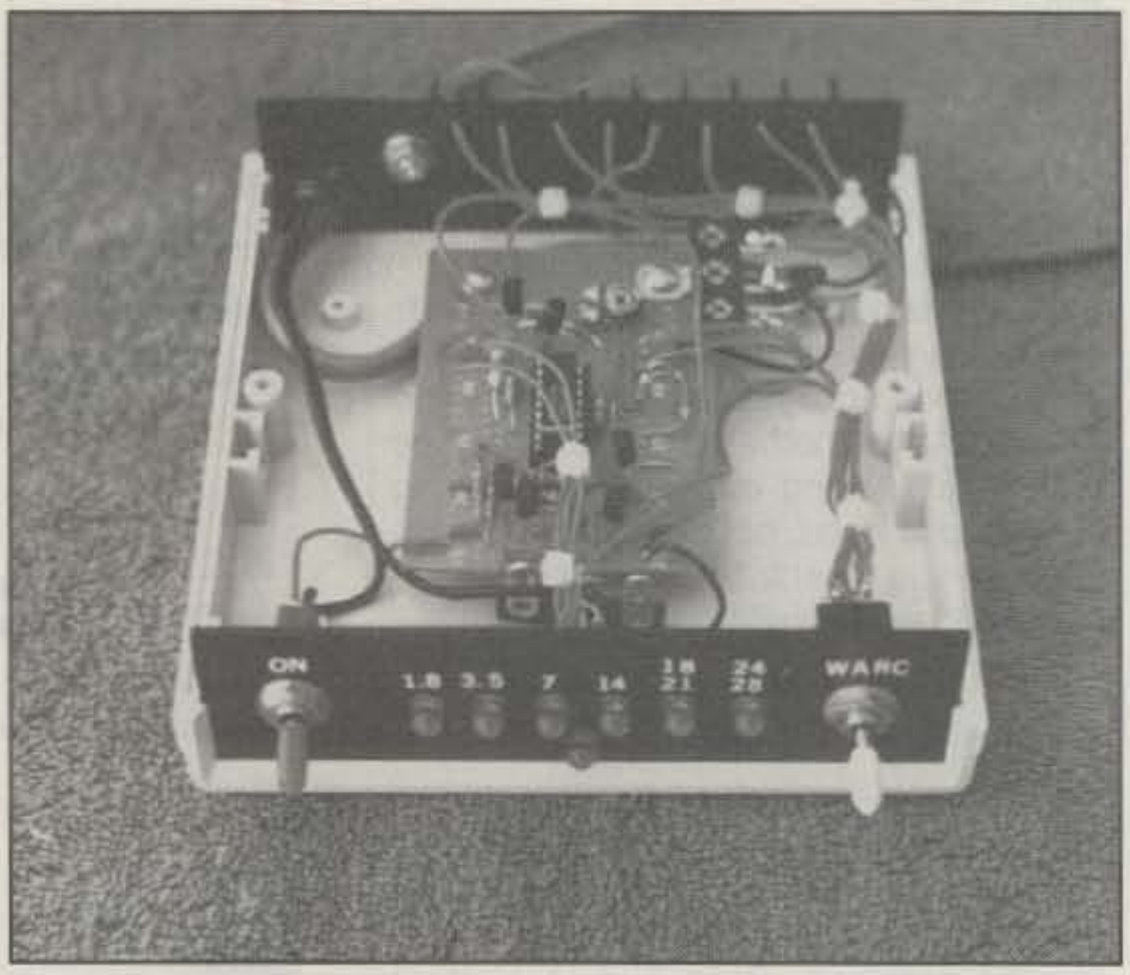
BY ART RIDEOUT*, WA6IPD

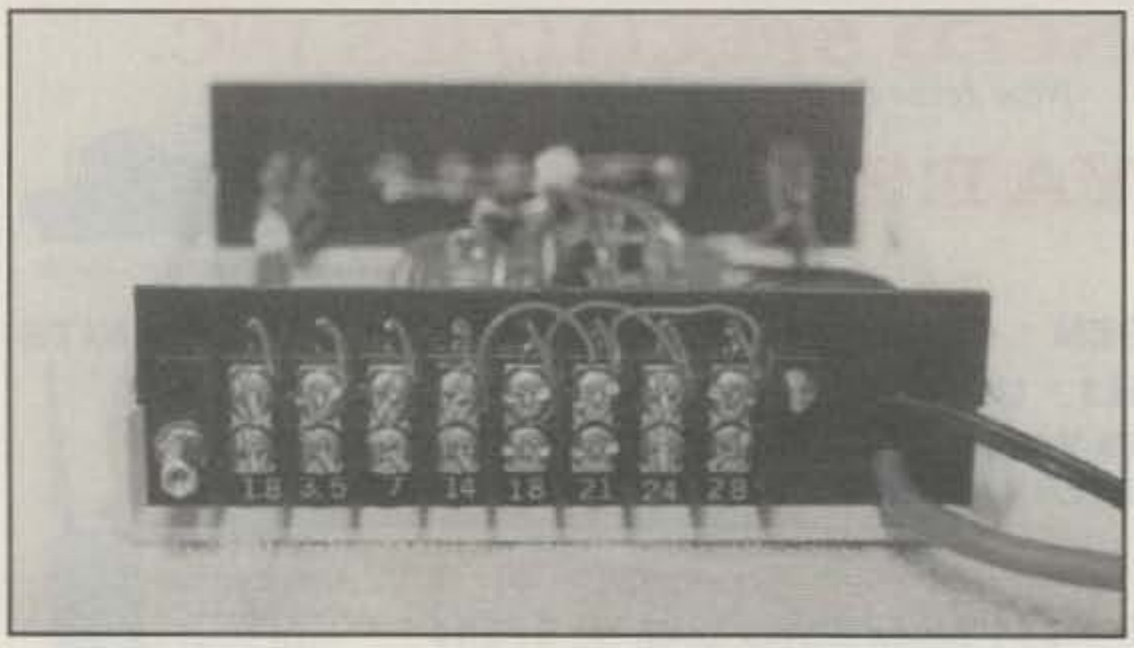
At my station I have five antennas covering 160 through 10 meters. Each antenna is selected by the use of an Ameritron five-position remote coax switch. The system works well, except that I frequently surf, and when I do, I have to constantly change antennas via the manually operated coax switch. To alleviate this constant aggravation, I have designed a simple electronic antenna switch that automatically turns on with my transceiver and then automatically selects the correct antenna.

*2235 Gum Tree Lane, Fallbrook, CA 92028

Description

ICOM transceivers have accessory connectors on the rear to provide the various voltages and signals for accessory equipment. One of the voltages provided is for switching automatic antenna tuners and linear amplifiers. The voltage is in steps between 1.2 and 8.0 volts, corresponding to the bands between 1.8 and 28 MHz. In this design, the voltage which is from pin 4 of ACC(2) is applied to the input of an LM-3914 IC. The output of the IC is used to activate transistors which are used as switches to provide 12 volts DC for the remote coax relays. For example, if I switch my transceiver to the 14 MHz band, I get a voltage of 4.0–4.5 at pin 4 of ACC(2). This voltage is applied to input pin 5 of the IC, which will activate a switching transistor connected to IC pin 16. The 12 volt out-





(Top left)- Front view of the completed project. It makes a nice addition to the shack.

(Top right)- The interior view shows the open nature of construction using readily available components.

(Bottom left)- The rear view shows the simple barrier strip hook-up.

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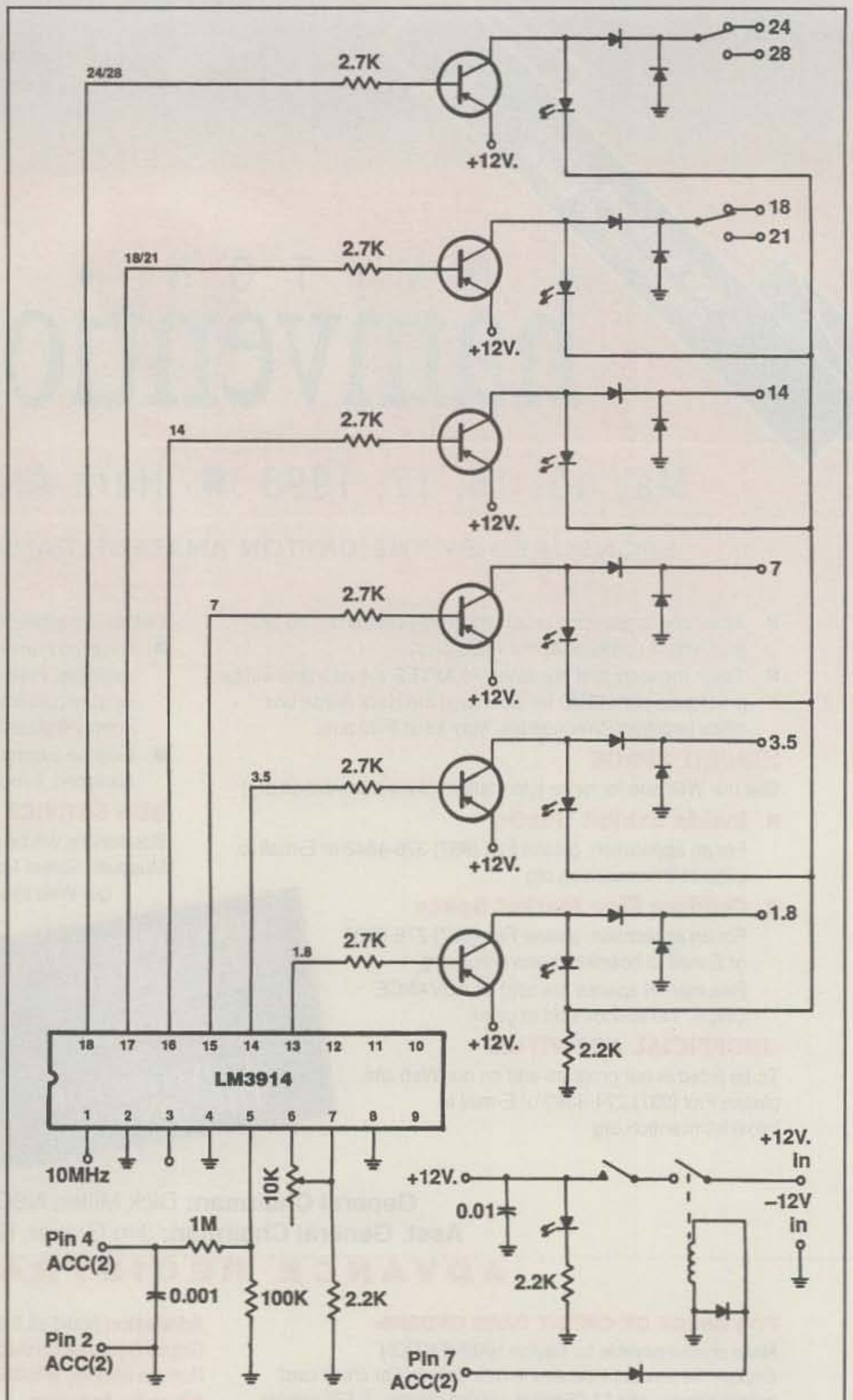

Abbreviated Parts List

Transistors:	MPS2907
Integrated circuit:	LM-3914
LEDs:	5 mm 10 ma @ 2 V
Diodes:	1N914
Resistors:	all 1/4 watt 5%
Capacitors:	disc ceramic

I recommend three sources for parts: DC Electronics, 1-800-467-7736
Hosfelt Electronics, 1-800-524-6464
RadioShack

Fig. 1– Schematic diagram for the automatic antenna switch.

put from the switching transistor then activates the remote 14 MHz antenna relay.

Construction

This unit is very simple to construct. I mounted the components on one half of a RadioShack printed circuit board and used one of their project boxes as a case. If you drill the holes for the LEDs slightly small and then carefully ream out the holes, the LEDs can be pressed into the front panel with no glue necessary. A 10K ohm PC-mount potentiometer is installed between pins 6 and 7 on the IC. This is a scaling adjustment and is adjusted so that only one LED is lit at a time. Setting this control to 4K is a good starting point. Approximately one volt will be dropped across the switching transistor, so the power source should be at least 13 volts. I found the wall-plug 12 volt power supplies usually provide an output voltage of between 13 and 16 volts, which is excellent. The supply should have a minimum rating of 300 ma. Also use caution connecting the supply. If you reverse the polarity to the IC, it will not forgive you.

Pin 7 on ACC(2) provides 12 VDC when the transceiver is operating. I use this voltage to operate a small relay, thus providing an automatic power-on feature. You will note that I did not include the 10 MHz band. This was a personal choice, but if you wish, you can easily include this band by duplicating the output circuitry and connecting to IC pin 1. The LEDs are connected to a common 2.2K resistor because only one LED at a time will be activated. The transceiver output voltages for the WARC bands are the same as those for the 21 and 28 MHz bands. To make this operate, a DPDT switch is mounted on the right of the front panel. See the schematic for switching details. MARS operators might want to use a 3-pole double-throw for this switch, because when the transceiver is tuned above 4 MHz, the 7 MHz antenna is automatically selected.

Operation

The 12 volt switched output from each transistor terminates on a rear panel terminal strip. At this point the outputs may be jumpered together if necessary. For example, if you use a triband beam, then you will want to jumper the 14, 21, and 28 MHz output terminals. As you change bands and wish to operate on the WARC frequencies, it will be necessary to flip the right-hand switch to the up position. This is in accordance with Murphy's Second Law, "Nothing will ever be perfect."

With nearly everything automated in today's transceivers, about the last thing that can be automated is the selection of the antenna. This circuit does that. Once you enjoy the ease of automatic antenna switching, you will want nothing less. ■

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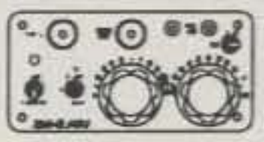

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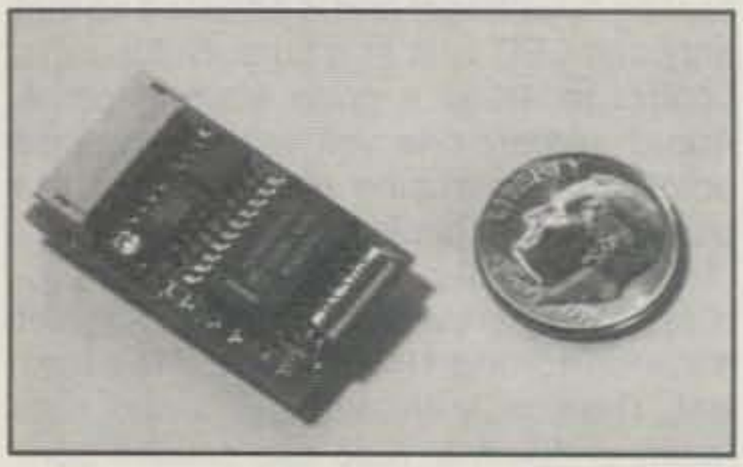
The T8A is water-resistant and features a die-cast aluminum chassis. Tone squelch, pocket beep, and auto-squelch are standard features, as are auto-power saver, electronically controlled volume, and direct keypad input. A guide function allows display of the selected set mode item in the T8A's display window for setup convenience.

For more information, contact ICOM America, 2380 116th Avenue NE, Bellevue, WA 98004; on the web <http://www.icomamerica.com>; or circle number 101 on the reader service card.

ANI Encoder from Communications Specialists

The ANI-1 miniature ANI encoder is a microprocessor-based PCB that provides instant identification of mobile and portable two-way radios. The ANI-1 uses a high-speed multi-tone sequence for data transmission on an RF channel. Incoming unit ID and status message transmissions can be decoded and displayed on a personal computer by using the ANI-2 station decoder. It is compatible with links and repeater systems. The ANI-1 measures 1.13 × .66 × .22 inches with easy interface connector.



The ANI Automatic Numbering Identification System is available from stock and carries a five-year warranty. For a catalog and further information, contact Communications Specialists, Inc., 426 West Taft Avenue, Orange, CA 92865-4296 (800-854-0547, fax 800-850-0547 US and Canada; 714-998-3021; fax 714-974-3420 Intl.), or circle number 102 on the reader service card.

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Three new cable assemblies have been added to the Cable X-Perts line. The first is a 3 ft. RG58/U coax 95% braid coverage with a right-angle male BNC connector on one end. The connector is nickel plated with a Teflon dielectric and a gold pin. The other end has a UHF SO239 connector which accepts a PL259 connector, which is nickel plated, Delrin dielectric, and a silver pin. Part # 18240CBS3; price $14.95.

The second is a 3 ft. RG58/U coax 95% braid coverage with a right-angle male BNC connector on one end. The connector is nickel plated with a Teflon dielectric and gold pin. The other end has a PL259

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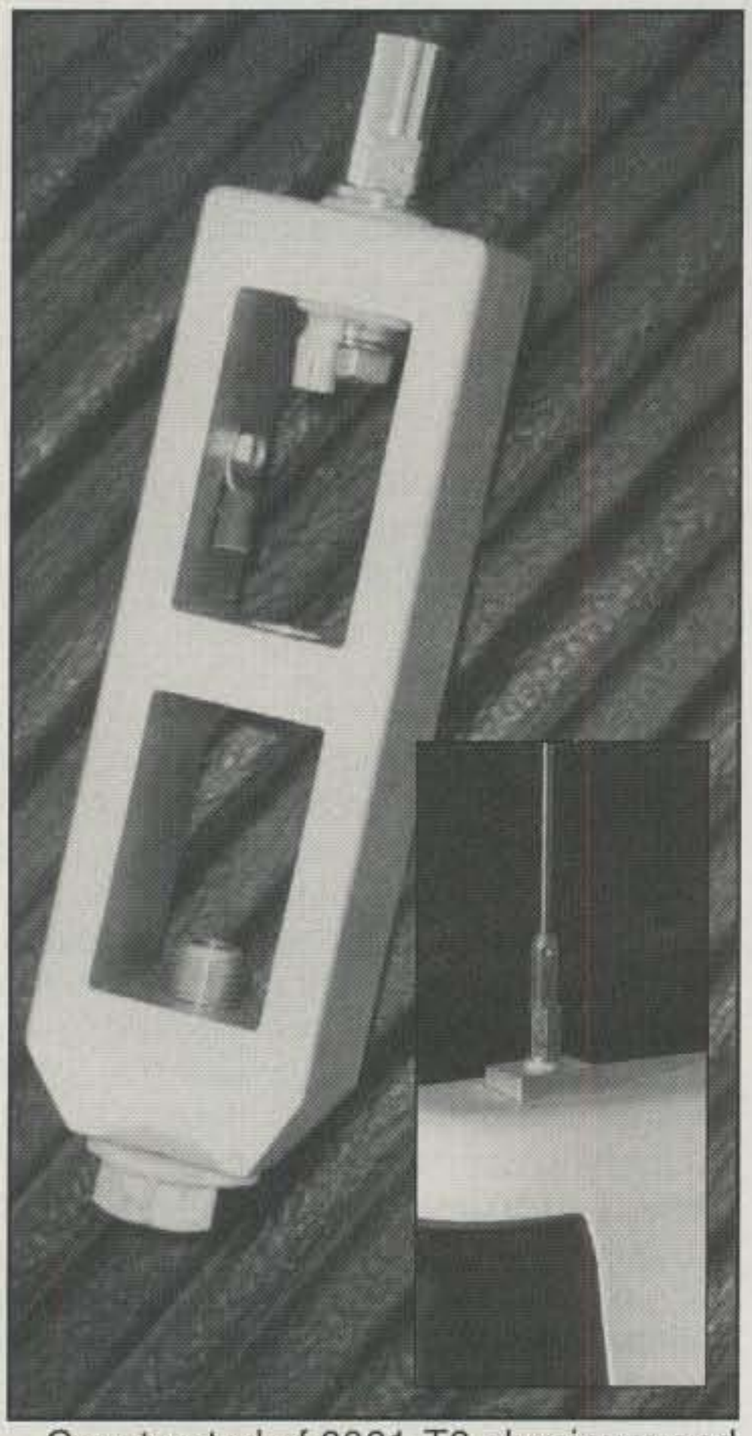
connector, which is silver plated, Teflon dielectric, gold pin. Part # 18240CBP3; price $14.95.

The third cable is a 3 ft. RG174/U miniature 50 ohm coax with male BNC connectors on each end. It is lightweight and flexible. Part # 18216CB3; price $9.95.

All terminations are soldered and/or crimped and tested for complete electrical and physical integrity. Prices do not include shipping. Minimum order $20. For more information, contact Cable X-Perts, Inc., 416 Diens Drive, Wheeling, IL 60090 (847-520-3003; fax 847-520-3444; e-mail <cxp@ix.netcom.com>; on web <www.cablexperts.com>), or circle number 103 on the reader service card.

GeoTool Pickup Truck Antenna Mount

GeoTool's new Pickup Truck Antenna Mount is designed to fit stake holes on full-size GMC, Chevrolet, and Ford pickup trucks dating back to at least 1988. It also fits the new small-size Ford pickup by Mazda, and a model is in the works for the full-size Dodge pickups.



Constructed of 6061-T6 aluminum and anodized for a long-lasting finish, the mount will fit stake holes 1.5" × 2" × 6.5". A standard 3/8-24 coupling nut accepts most antennas made today. Price of the mount is $44.95. For more information, contact GeoTool, 1280 Bison Ave. B-9, #414, Newport Beach, CA 92660 (phone/fax 714-759-3166; e-mail <info@ geotool.com>; web <http://www.geotool.com/antmount.htm>), or circle number 104 on the reader service card.

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The MFJ-4035MV is priced at $149.95. For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (800-647-1800; fax 601-323-6551; e-mail <mfj@mfjenterprises.com>; web <http://www.mfjenterprises.com>), or circle number 105 on the reader service card.

Idiom Press Logikey K-3

Idiom Press has announced the availability of the Logikey K-3, "an elegantly rendered, factory-built version of the famous Super CMOS III keyer," maker says. Logikey K-3 replaces the K-1 keyer with essentially the same command set as well as new features. The K-3 offers six programmable, nonvolatile memories with a total capacity of 1530 characters, An additional 12 memories can be stored in background. The keyer offers emulation of the timing of other keyers as a user-selectable option, including Curtis "A" timing. There is also a variable compensation provision available to restore truncated elements.

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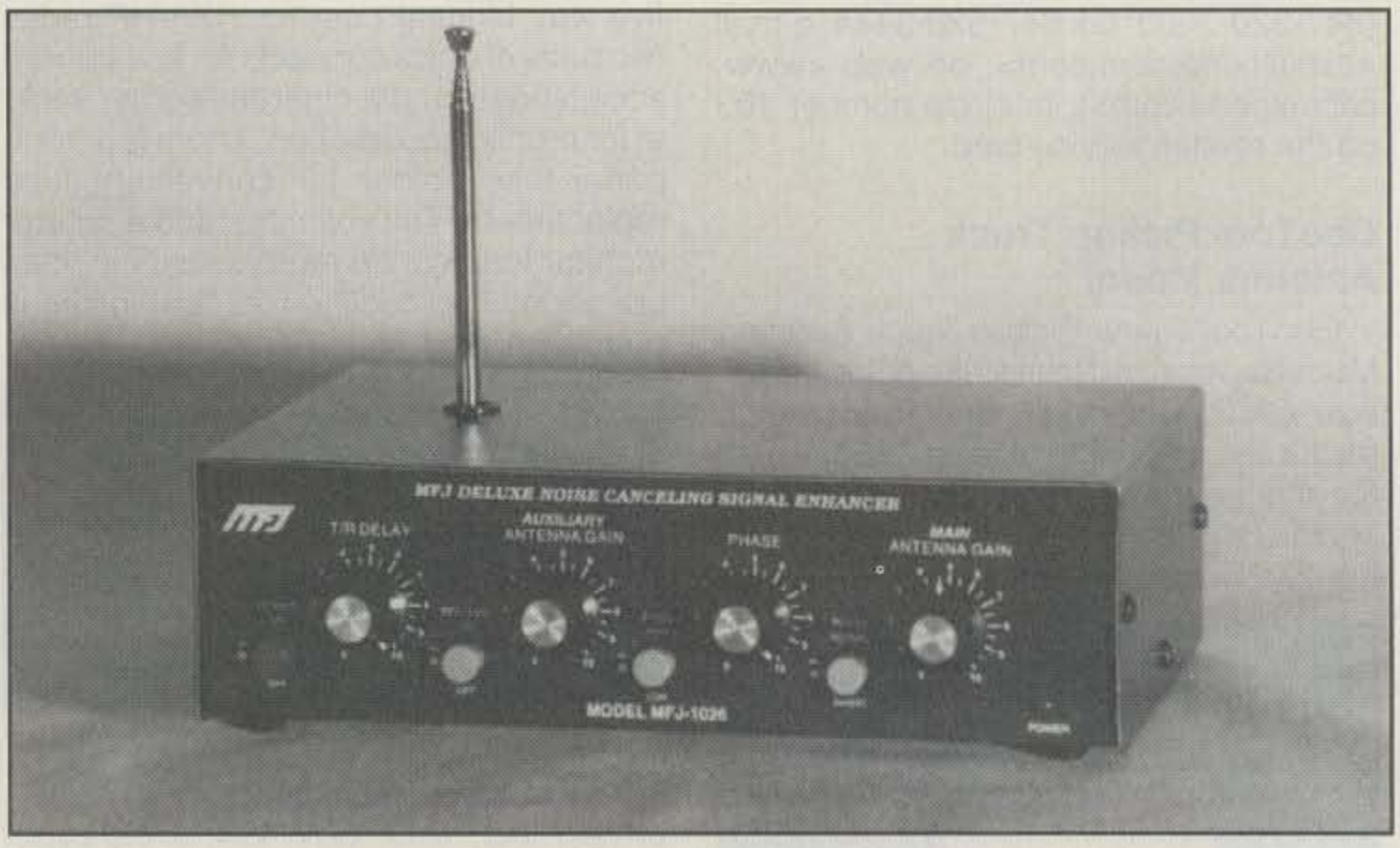
The MFJ-1026 Noise and Interference Canceler

BY DR. THEODORE J. (TED) COHEN*, N4XX

Noise and interference! They seem to part of every amateur's life these days. Power-line noise, high static levels associated with distant thunderstorms, interference from household appliances as well as interference from nearby (either geographically or spectrally) signals—all threaten our ability to communicate, not to mention our sanity! At my suburban location, the problem I faced was specific to the 160 meter band—high QRN levels that masked weak DX signals. Were that I had room for even one Beverage receiving antenna. However, that is not possible, so I turned to the MFJ-1026 as an aid to improving the signal-to-noise ratios of the Topband stations I was chasing. In the process, I found out that this little device could also banish from my receiver such things as line noise, halogen lamp noise, and even spurious signals generate by a television receiver.



The MFJ-1026 noise and interference canceler.

Theory of Operation

The MFJ-1026 contains four major elements: (1) a noise amplifier, (2) a bridge-type phasing circuit, (3) an active combiner, and (4) a transmitter change-over relay circuit. It also contains internal high-pass filters that begin to roll off on the 160 meter band, ensuring that nearby AM broadcast stations will not become a problem by overloading the noise amplifier.

In operation, the MFJ-1026 basically creates a "phased antenna system" using just about any pair of antennas you may have available. The only requirement imposed here is that both antennas must "hear" the noise you wish to cancel equally well. For the best results, MFJ recommends that both the transmit (**Main Antenna**) and noise (**Auxiliary Antenna**) antennas have the same basic pattern, although results using a dipole and an inverted L exceeded my expectations (more on that below). With the offending noise available from both antennas and with the signal (noise) levels equalized using the front-panel gain controls (**Auxiliary Antenna Gain, Main Antenna Gain**) on the 1026, the operator need only vary the phasing control (**Phase**) to null the interference. Importantly, the **Phase** control allows signals from the **Auxiliary** antenna (or the whip antenna supplied with the unit) to be rotated in phase more than 145 degrees from 1.8 to 30 MHz. A front-panel **Phase** switch allows the selection of either zero or 180 degree shifts, with the total phase shift range being the sum of the **Phase** control delay and the delay selected by the **Phase** switch. This is handy because sometimes it's easier to peak a given noise source (or interfering signal), and then to null it out by simply inverting the phase with the **Phase** switch. The phased signals then are combined and fed to the receiver through a line driver. MFJ advertises that "[y]ou can place a null up to 60 dB deep on *any* type of noise and interference . . . "

Obviously, the 1026 also can be used to enhance desired signals. For the best performance, both antennas should "hear" the desired signal equally well.

As already noted, the system also includes a transmitter change-over relay circuit. More specifically, radio-frequency (RF) sensing circuitry is provided to automatically bypass the unit during transmission, although MFJ is *emphatic* in their recommendation that operators use the rear panel **T/R Control** line input for maximum protection of the equipment.

Installation

Installation is straight-forward and well covered in the instruction manual. Where only a transceiver is being used, the 1026 is simply installed between the transceiver and the transmit antenna or antenna tuner. (*Note:* Never, *never* use the MFJ-1026 with a transceiver having an internal antenna tuner unless the SWR without the tuner is less than 2:1. Nor should you use it directly between a transceiver and an antenna unless the SWR of the antenna at the transmitter is less than 2:1.) In cases where a power amplifier is being used, the MFJ-1026 should be installed between the transceiver and the amplifier. The RF power-handling limit of the MFJ-1026 is approximately 100 watts, which should provide an adequate margin over the roughly 70 watts needed to drive most of today's power amplifiers.

The MFJ-1026 requires 10 to 15 volts DC from a negative ground supply. Current drain is less than 150 mA, so a 120 VAC to 12 VDC adapter (e.g., MFJ-

*8603 Conover Place, Alexandria, VA 22308-2515

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1312B) can power the unit easily. Whatever power source you use, however, should have good RF noise immunity.

The noise antenna you use can be the supplied whip, a special internal or external antenna, or simply a spare antenna not in use at the time. For nulling local noise (e.g., power-line noise), it is recommended that the optimal noise antenna be one located close enough to the noise source such that it "hears" the noise better than any desired signal. As you will see below, I use a 10–160 meter trap dipole as the noise antenna because it "hears" power-line and other noise propagated on the power lines (e.g., noise from a halogen lamp in the den) as well as the inverted L I use on 160 meters, *and* because it "hears" distant noise (e.g., thunderstorms in the Gulf of Mexico) about as well as, if not better than, the inverted L. (A simple coax switch [e.g., MFJ-1702B] gives me the ability to switch the trap dipole between the 1026 and the output of the antenna tuner so that I can use this antenna for both transmitting and receiving in the conventional manner.)

It should be noted that the MFJ-1026 does incorporate a modicum of protection (a 50 mA, 12 volt dial lamp) on the **Auxiliary Antenna** input from excessive voltage. I took no chances and ran the auxiliary antenna through a C&S Engineering "Front End Saver" to ensure that the unit never experienced excessive RF voltages via this route.

Operation

Amateurs in Virginia are fortunate in having a power company (Virginia Power) that not only responds quickly to calls for assistance in silencing line noise, but also maintains a test and evaluation laboratory that makes sure they aren't fielding tomorrow's problems today! However, their personnel can't be expected to be available each and every time the wind, rain, or snow causes a temporary problem. That's why I initially purchased the MFJ-1027; I was going to use it primarily to null the occasional high levels of power-line noise I experience from the overhead 40 kV feeders in the neighborhood.

In stepping through the very detailed operational instructions in the 1026's manual early one night in January 1998, and in getting the "feel" of how the gain and phase controls interacted, I was struck by the observation that by using the 10–160 meter trap dipole as the auxiliary antenna and the inverted L as the main antenna, *I was able to achieve almost 40 dB of nulling on the QRN being generated by a major storm in the Gulf of Mexico* (at least there's where I intuited the storm to be; the remainder of the country did not seem to have very active weather patterns at the time). Not only that, weak European Topband signals that I could *barely* detect on the inverted L alone were suddenly Q3 or Q4, and sometimes even Q5! Suddenly I was able to hear and work stations that heretofore I might have passed over. It was as if I had stumbled on the creation of a "city-dweller's Beverage."

MFJ was way ahead of me, though. In a section of the instruction manual entitled "Other Applications," the company discusses how to combine two antennas—for example, two parallel Beverage antennas spaced an eighth to a quarter-wave apart—to improve the front-to-back ratio, steer nulls, or add desired signals. The possibilities are endless. Which configuration is best for you? Only experimentation will tell!

A few nights after discovering how effective the 1026 was against storm-generated QRN, I was suddenly inflicted with an S-7 noise level that sounded like a corona discharge. A quick search of the house with a portable shortwave receiver pinpointed the problem to be the 300 watt halogen lamp in the den. Filters on the AC line didn't even "touch" this noise problem. With the MFJ-1026, however, I could completely (and I mean *completely*) null the lamp noise out!

That same evening, while browsing through the Top Band Mail Reflector <http://www.contesting.com/_topband/>, I read about John Devoldere's (ON4UN) noise problem. It seems that a new chemical plant not far from his home was brought on stream late last year, virtually destroying John's receiving capabilities on the 160 and 80 meter bands. The noise was so bad that it jeopardized his being able to participate in the late-winter DX contests scheduled for February and March. I immediately recommended that he purchase the 1026 and incorporate it in his low-band station. This he did in early February, and the results were nothing less than amazing. According to John, *he could almost make the noise completely disappear using the MFJ-1026!*

Conclusion

So dependent have I become on the MFJ-1026 that I use it whenever I am on the 160 or 80 meter bands. The unit's ability to null noise of all types, and especially line noise and storm-related QRN, makes this noise and interference canceler a valuable accessory to almost every station using these bands. Moreover, judging from the storm-related noise most DXpeditions (e.g., 9MØC) face when operating in the tropics, the use of the 1026 in their low-band stations should surely result in increased QSO rates for stations in those hard-to-work areas of the world.

The MFJ-1026 with built-in noise antenna sells for $159.95. A companion unit, the MFJ-1025, which does not include a built-in antenna, sells for $139.95. The MFJ-1312B power adapter sells for $12.95, while the MFJ-1702B two-position coax switch sells for $21.95 (add shipping to all prices). Contact MFJ at 800-647-1800 or call your local dealer. (Note, however, that the 30-day return policy is only offered by MFJ on direct sales to you.) The MFJ Website URL is <http://www.mfjenterprises.com>. Finally, the C&S Front End Saver sells for $49.95; to order, call 219-485-1458. The C&S Website URL is <http://home1.gte.net/crlewis/index.htm>. ■

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BY KARL T. THURBER, JR., W8FX

THE DIGITAL DIPOLE

FROM SOFTWARE THROUGH ANTENNAS FOR THE SHACK

Come What May '98

April flowers, and in their wake, May showers. Yes, once again it's May. Spring is bursting out all over, and many amateurs' thoughts (including mine) naturally turn to antennas. Stay with us as we launch this column with the theme "Come What May '98."

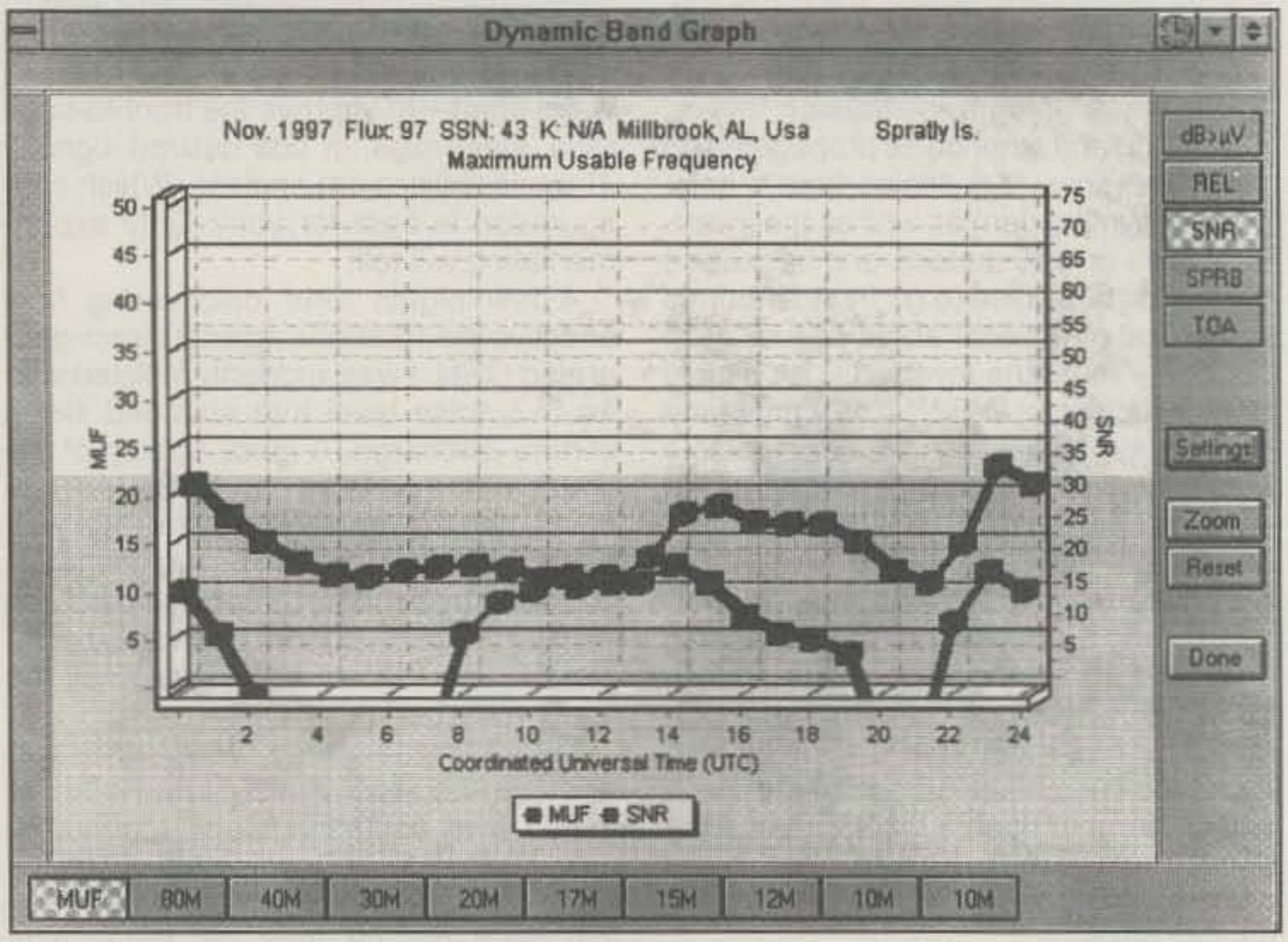

Fig. 1– WinCAP Wizard 2.0 is a simple-to-use HF propagation prediction program from Kangaroo Tabor Software. Wizard 2.0 features a "best usable band" graph and a "dynamic band" graph. The dynamic band graph, an example of which is shown here, provides various important parameters at the MUF, plus at all user-selected frequencies. Also, clicking any data point displays more information, such as the actual data value and propagation mode.

Antenna Notes

OLAM Machinery Extend-A-Mast. Extend-A-Mast is billed by the manufacturer as a "new concept telescoping antenna mast." It is, in fact, a portable, multi-section device that one person easily can raise or lower. It incorporates a series of telescoping tubes, pulleys, guy ropes, and proprietary latching mechanisms. The telescoping tubes are nonmetallic and nonconductive, providing an excellent method for supporting antennas.

The biaxial, filament-wound composite construction and polypropylene guy lines provide a very stable and strong support system designed to withstand winds over 80 mph while supporting 25+ lbs. The device's retracted length is 23 ft. and extended length is 50 ft., while its weight is a surprisingly low 80 lbs.

Extend-A-Mast is intended to be used primarily with wire antennas, including verticals, quads, slopers, and inverted-Vee types. The manufacturer's favorite antenna is one created by fitting a series of four slopers around the perimeter of the Extend-A-Mast, arranged at 90 degree intervals. The signal is fed to one or two of the slopers, depending on the desired direction of favored emission.

The $1489 mast is delivered assembled as a ready-to-raise system that includes all required hardware; you need only supply the guy posts and antenna. It's from OLAM Machinery, Inc., Route 2, Box 17A, Pocahontas, IL 62275 (618-654-2309).

J. Martin Systems S.T.S. Entrance Panel. In previous columns we noted radio hamshack products offered by J. Martin Systems, in February 1994 profiling the "Ground It" bus. To recall, this is an inexpensive accessory bus to facilitate proper amateur station grounding. The bus helps protect equipment and makes chassis ground connections short and neat, with all the benefits good grounding brings. The heart of the system is a 1/8 inch by 1/2 inch solid copper bus that provides a grounding stud every 6 inches. Several standard lengths are available.

In September of last year we noted the addition of another product. This was the portable, 2 meter Tabletop Antenna, a halfwave handitalkie (HT) antenna that helps keep potentially dangerous RF from being in close proximity to your head as with most other HT antennas. The antenna includes a 6" × 6" × 1/8" aluminum minigroundplane in the base and features a detachable, 10 inch telescoping mast that extends to 40 inches.

Now the firm offers the S.T.S. Entrance Panel, a sturdy device to help with the problem of safely and conveniently bringing coaxial cable and grounding wires through windows to the hamshack. The unit has a heavy phenolic inside front panel with adjustable side panels that fit 24 to 36 inch wide windows; six coax entrance ports are provided. The outer weatherproof compartment and end panels are constructed of PVC material. It includes a 12" × 12" × 1/8" solid copper plate for the installation of antenna surge suppressors and downlead to ground rods or a complete grounding system.

The S.T.S. Entrance Panel accepts practically every style of surge suppressor. There's a 60-day "no questions money back guarantee" and a 10-year warranty. The new unit is $179 plus $15 s/h and insurance from J. Martin Systems, 35 Hilltop Ave., Stamford, CT 06907 (fax 203-461-8768). An illustrated brochure is available from the manufacturer.

Update: M² Antennas Catalog. It's been a long time since we profiled the antennas and antenna accessories of M² Antennas. We last noted their products in December 1991 and February 1994.

The firm's antennas are based on designs by Mike Staal, K6MYC, a KLM Electronics co-founder and until 1986 KLM's antenna designer. The name "M²" stands for Mike and Myrna Staal, the company having been started by the two a few years before Mike left KLM. The family-

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owned enterprise takes great pride in the high quality of the machined parts used and the antennas' excellent mechanical features.

The firm is going strong with its HF monoband Yagis and multiband log periodics; 6 and 2 meter Yagi beams; various 2 meter specialized antennas (including some rather unique designs); and various special-purpose UHF and microwave beams and accessories. Antenna rotator/positioners, control units, and positioner accessories are prominently featured in their catalog.

For a free catalog, contact M² Antenna Systems, Inc., 7560 N. Del Mar Ave., Fresno, CA 93711 (209-432-8873; e-mail <m2inc@m2inc.com>; Web <http://www.m2inc.com>). The catalog includes a list of some 35 U.S. dealers.

Soft Stuff

WinCAP Wizard 2.0. As we noted in last July's column, there's no shortage of propagation analysis and prediction programs. However, some of the current crop of programs are difficult to use and interpret, being developed primarily for heavy-duty commercial users, or for amateurs who want to undertake sophisticated, long-term station and antenna planning. Many amateurs and SWLs simply want to know when and where to operate—the best time to try, the best band to use, and the signal strength to expect.

With these important considerations in mind, Jim Tabor, KU5S, came up with WinCAP Wizard for Windows, which takes an innovative approach to propagation prediction. The program effectively does away with buzzwords and technical jargon, and it eliminates the hassle of interpreting raw technical data. The powerful, yet friendly propagation browser interface and smart reporting features are welcomed by newcomers and old timers alike.

As we noted, the original Wizard is intuitive to use in a "real time interactive" manner, and it strives hard to balance ease of configuration and use with information requirements. Its smart reporting produces easy-to-understand reports based on your station power and antenna configurations. While we won't reiterate our previous review, we'll just mention that the program's introduction has brought a fresh, innovative approach to amateur propagation analysis.

Now Jim offers Wizard 2.0 for Windows. The new version builds on this strong foundation by adding user-configurable 3D color graphs, a new "location browser," and the integrated Beacon Wizard (which we reported on in September 1997), along with several brand new enhancements.

Wizard 2.0 features both a "best usable band" graph and a "dynamic band" graph

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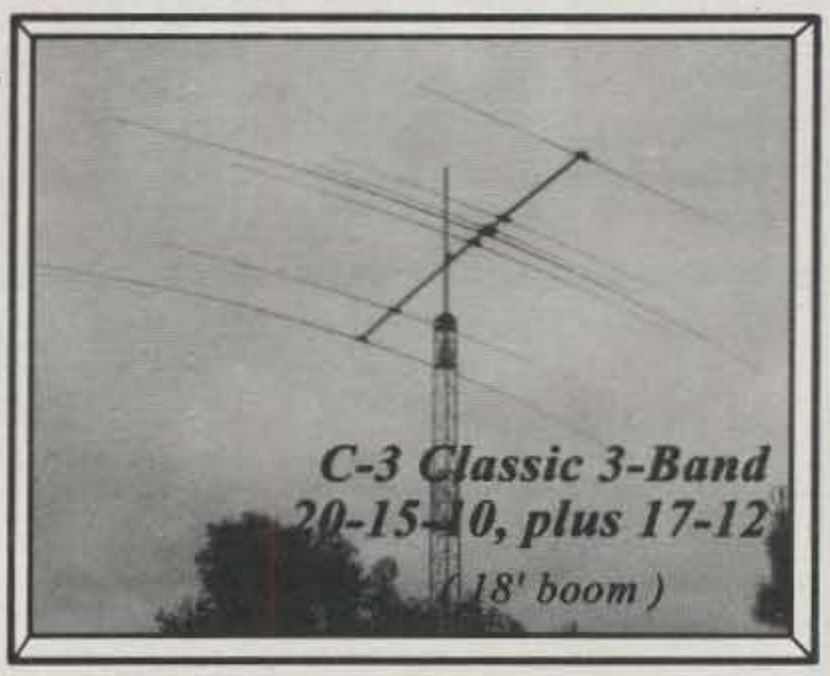

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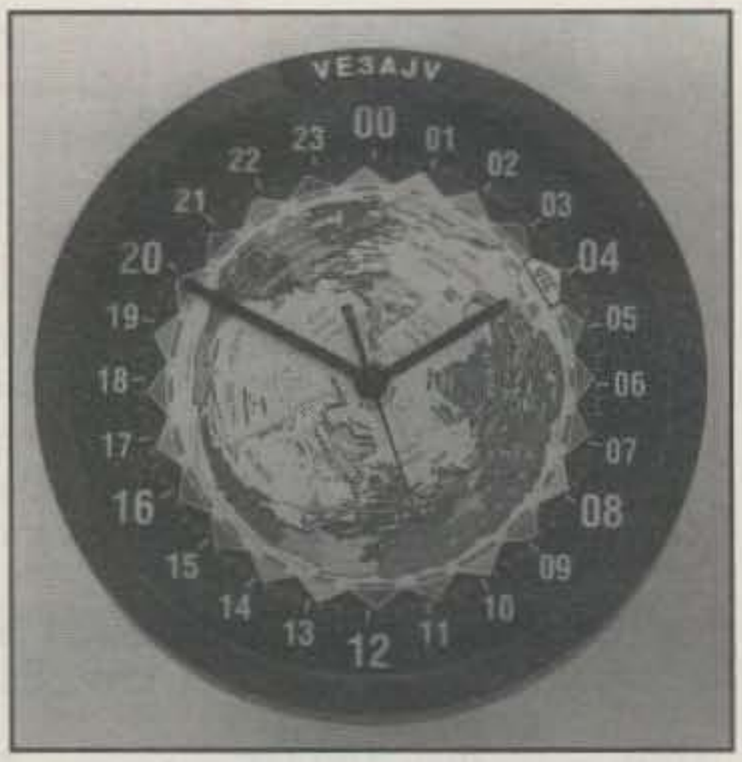

The "DXing Clock" from World Time View, Inc. features a flat, circular south polar view of the Earth, with all 24-hour time zones color coded on the land areas. Around the perimeter of the map are the 24-hour indicators corresponding to each time zone. Each time zone indicator is labeled with a significant city from that particular zone, and the hour hand is preset in the UTC (GMT) time zone. These new-version clocks have conventional hands rather than the airplane disk which previously had been used. (Photo courtesy World Time View, Inc.)

(fig. 1). The former graph displays frequency and signal-to-noise ratio by default; with a mouse click the graph can also display signal level, reliability, service probability, and signal take-off angle. The latter band graph provides these parameters at the MUF, plus all user-selected frequencies. Also, clicking any data point displays more information, such as the actual data value and propagation mode. Both graphs offer numerous user configuration options that you can play with.

The new, multi-configuration enhancements allow you to create and select individual profiles for what are called "circuit-option groups." The circuit option groups include system parameters, frequency set, transmit and receive antenna gains, and transmitter location. Predicted smoothed-sunspot numbers also are accessible, automatically or manually.

Wizard is $49.95 plus $5 s/h from Kangaroo Tabor Software, Rt. 2, Box 106, Farwell, TX 79325-9430 (fax 806-225-4006; e-mail <ku5s@wtrt.net>; Web <http://www.wtrt.net/~ku5s>).

Street Atlas 5.0 and Simply Streets. Several highly capable CD-ROM products we've featured in previous columns include excellent mapping and related software from DeLorme. These include Street Atlas USA™, AAA Map'n'Go®, Global Explorer®, and Phone Search USA™, among others. The company's Windows flagship product, Street Atlas USA, has undergone steady development; recently, Street Atlas 5.0 was released (see our coverage of V4.0 in June '97). V5.0 includes many new, enhanced functions that make it very attractive.

We won't rehash our previous review, but we will say that the new V5.0 offers all the functions of V4.0 and more. The new CD-ROM, which includes detailed street level maps of the entire USA, can expertly map a trip, and with the help of Global Positioning System (GPS) technology, literally "talk" you through it all along the way with DeLorme's Tripmate™ GPS receiver. Address-to-address routing helps you find your way from one address to another, and you also can see the locations of all types of businesses and points of interest on the maps.

Besides address-to-address routing and GPS Voice Navigation, the new version includes on-map symbols that show location and phone numbers of over two million businesses and other points of interest, comprehensive listings of services at Interstate exits, direct Internet access to hundreds of city Web pages for regional information, and the ability to download directions from Street Atlas USA 5.0 to a 3Com® PalmPilot™ device. The new Street Atlas USA version has an estimated street price of $45.

DeLorme also has come up with another, very inexpensive product, Simply

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For additional information, contact DeLorme, 2 DeLorme Dr., P.O. Box 298, Yarmouth, ME 04096 (1-800-227-1656; Internet <http://www.delorme.com>; or <http://www.streetatlasusa.com>).

From the Bookshelf

Everything You Forgot to Ask About HF Mobileering. Long familiar to your columnist and *CQ* readers as a dyed-in-the-wool, big-signal HF mobile enthusiast is Don Johnson, W6AAQ. Recently, Don came up with the successor to his self-published HF mobile scrapbooks, *40 Years of HF Mobileering* (in three editions) and the 1993 *40+5 Years of HF Mobileering*. His newest opus, now published by Worldradio, is *Everything You Forgot to Ask About HF Mobileering*. The new book with the catchy title, at 64 pages, is somewhat shorter than previous editions. However, since it is more tightly edited than previously, it succinctly gathers in one place this long-time, diehard HF mobileer's tidbits, tips, notes, and nostalgic recollections.

Included is information on his classic, automatic, no-relays DK^3 mobile antenna you can use to cover 10 through 75 meters. The antenna resonates without taps or roller coils and tunes continuously to any frequency from 3.5–30 MHz. No jumpers, open or shorted turns, or other loss-inducing features are used, yet an essentially flat 1:1 SWR is claimed to be attainable on all frequencies within the design range. One of the best features of the DK^3 antenna is that it resonates at any frequency from 3.5–30 MHz without the need for the driver or the passenger to leave his or her seat.

Although not a textbook, Don's new offering should be of help to anyone in assembling an efficient and effective HF mobile station. The large-format (8^1/$_2$" × 11") book is $8 plus $2 s/h from Worldradio Books, P.O. Box 189490, Sacramento, CA 95818 (916-457-3655; e-mail <kb6hp@ns.net>).

Note: Check out Don Johnson's new Web page, devoted to HF mobileering, which was under construction when we first checked it out. You'll find it at <http://www.mother.com/~w6aaq>. Yet another page you'll want to check out if you're a mobileer is Les' Amateur Radio Page, W6TEE at <http://home.pacbell.net/lcobb>. His Web page has a number of useful links to several other specialized HF mobile Web pages.

The VHF "How To" Book. Our colleague Joe Lynch, N6CL, is the "VHF Plus" column editor for *CQ* magazine, and has been VHF Editor since 1991. An Extra Class licensee, Joe's long list of teaching and training credentials includes teaching electronic, computer, business, and real estate courses at a number of schools, including Oklahoma City University, the FAA, and various community colleges and public schools. Joe is active on HF and, especially, on 6 and 2 meters and 70 cm. Joe also has written for *QST, Communications Quarterly,* and *Sky and Telescope* magazines.

The VHF "How To" Book, appropriately subtitled "A Guide for All Amateurs," fills a real void in amateur radio. Joe's book, published by CQ Communications, is designed to be a complete, all-in-one-place operating guide that caters both to the new and experienced VHF enthusiast. Joe says he wrote the book because when he began venturing into the VHF world, he found that he had to consult several volumes to find all that he needed to know.

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You know the drill: read one book on propagation, another to find out about equipment design, another to learn of frequency allocations and bandplans, another to figure out how to work amateur satellites, and yet another to learn about communicating over the local FM repeater. That's not fun, especially for the rank beginner.

Joe's book successfully combines these basic information sources to make available a single, easy reference for beginners that also doubles as an excellent resource for old timers who want to learn about operating on the higher frequencies. The 124-page, well-indexed book is $15.95 from CQ Communications, Inc., 25 Newbridge Rd., Hicksville, NY 11801 (1-800-853-9797).

ARRL 1998 Handbook. We'd again like to direct your attention to *The ARRL Handbook,* which we first reviewed in July 1992. The new 1998 "75th Anniversary Edition" tops out at 1191 pages in some 30 chapters plus an index, and as such is the definitive amateur radio sourcebook. Again, the *Handbook* is organized into five major parts: an introduction, fundamental theory, practical design and projects, construction techniques, and operating practices. Each chapter is a "mini-book" that addresses a vast array of material. Antennas are well-covered in the *Handbook,* although of course they're not presented in as much detail as that found in *The ARRL Antenna Book.*

One change from recent editions is that the 1998 edition no longer contains software. There *is* software associated with the *Handbook,* but it's no longer bundled with the book. Instead, you download the software disk (HBK98.ZIP, 1.46 MB) from the ARRL's Web site by going to <http://www.arrl.org/notes/>. You also can order a copy of the 1998 Handbook Software Disk from the ARRL at $10. The minor inconvenience caused by eliminating the bundled disk allowed the League to cut production costs and make the book available for $6 less than last year's $38 price.

The 1998 book is $32 plus $6 s/h from the American Radio Relay League (ARRL), 225 Main Street, Newington, CT 06111-1494 (1-888-277-5289; e-mail <pubsales@arrl.org>; Web <http://www.arrl.org>).

Short Bursts

Canadian Clock Update. In October we profiled two attractive and highly functional "Universal Time Clocks" (UTCs) from a Canadian firm, World View Time, Inc. The new clocks were designed specifically by their developer, Dwight Darling, for amateur radio operators, and serious SWLs are likely to appreciate them as helpful DX accessories, as well.

As we noted last October, the clocks' face is unique, consisting of a flat, circular south polar view of the Earth having all 24-hour time zones color coded on the land areas. Around the perimeter of the map are the 24-hour indicators corresponding to each time zone. Each time zone indicator is labeled with a significant city from that particular zone, and the hour hand is preset in the UTC (GMT) time zone.

However, the second hand was a clear plastic disk featuring an airplane which rotated above the world map face: we found that it can take some time to get used to the unconventional hands. We're happy to see that Dwight has reengineered the clocks to make the hands more conventional, and in the process has renamed his product the "DXing Clock."

The attractive, revamped DXing Clocks are available from the manufacturer in two different designs. One is contained in a plastic case for $39.95 (U.S.), the other in a very nice walnut case for $59.95. Each clock is accompanied by a free, 8 1/2" × 10" manual world time calculator.

When ordering a clock, include $4 s/h per clock, which includes import duty. Visa cards, checks, and money orders are accepted for payment. Furnish your callsign, since the clocks are personalized with it.

For more details or to order, contact Dwight Darling at World View Time, Inc., P.O. Box 266, Brockville, ON Canada K6V 5V5 (613-345-1537; e-mail <worldviewtimeinc@recorder.ca>; Web <http://www.recorder.ca/worldviewtimeinc>).

Wrap-Up

That's all for this time, gang. Next time more "Digital Dipole" topics of current interest. See you then.

Overheard: The trouble with trying to save for a rainy day is that most of us don't event start saving til it starts to sprinkle.

73, Karl, W8FX

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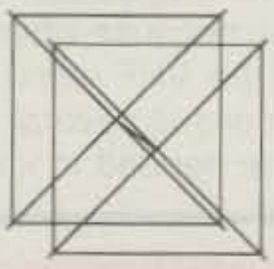

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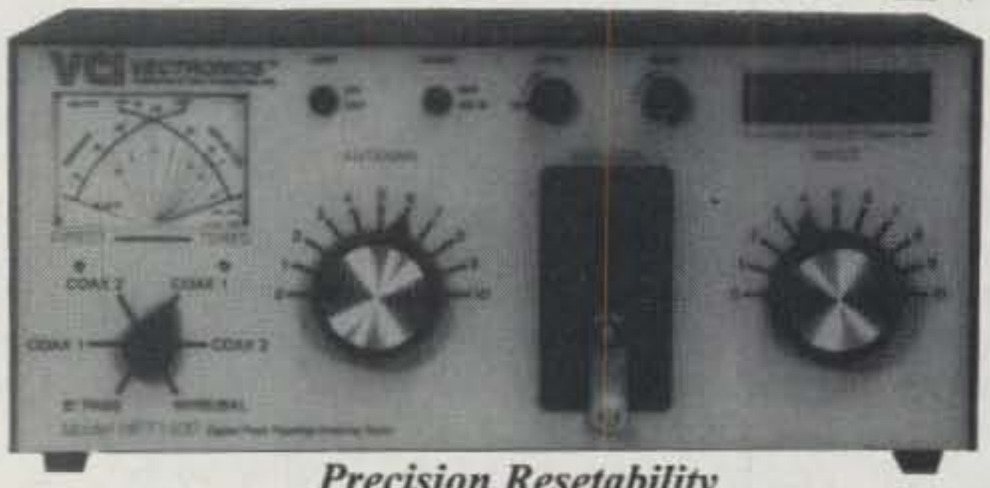

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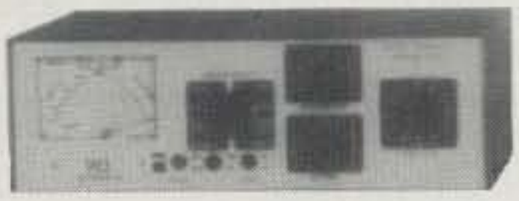

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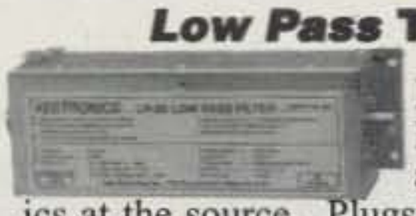

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CIRCLE 15 ON READER SERVICE CARD

BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

The Phoenix Rises! Modifying the Ericsson/GE Phoenix for Packet Use

The Ericsson/GE VHF Phoenix SX is a 40 watt, 16 channel transceiver. There is also a 2 channel crystal-controlled version of the Phoenix. Both versions are compact and easily modified to work as packet radios. The Phoenix can be found at many hamfest fleamarkets and surplus from other sources such as two-way radio service shops and dealers.

The Phoenix is probably one of the most used (modified) commercial radios for packet radio use. There are two versions of the Phoenix. One is the crystal-controlled version, and the later model is a 40 watt programmable version.

Frank, K4ICT, has dug them out of junkboxes at hamfests and put them on the SEDAN, and other friends have done the same. I know of several that are on backbones at 9600 baud. As a matter of interest, the one I am working with for this article has been linking at 9600 baud to another nearby 9600 baud station.

The proof of compatibility is in the way this Pheonix SX, with an MFJ-1270CQ Turbo TNC, easily links to an MFJ-8621 DataTransceiver with an DRSI DPK-9600 TNC. The link is only 23 miles as the crow flies, but it quickly demonstrates how the 40 watt Phoenix can link to another system that is running only 7 watts.

At 9600 bauds, the TXDelay of both Phoenix units is under 15. However, it stands to reason that if you decide to use the crystal-controlled version in 9600 baud service, the stability and rapid rise-time of a crystal oscillator makes for an even faster TXDelay.

The 40 watt VHF programmable version is synthesized and can be programmed using a briefcase (some call it a "suitcase") programmer. There is one tiny problem with the latter: The search for the "briefcase" programmer could become a problem, as these commodities are becoming rare and scarce.

A Friend Named "Ben"

As it happens, I have a very good friend named Ben Jones, KB4MPX, who is an expert programmer. He can even program one of these jewels in his sleep. As a matter of fact, he and Pete Lascell, W4WWQ, are often my advisors on many of the Ericsson & GE radios that I modify.

We amateurs around Lynchburg, Virginia consider ourselves fortunate to have these two as part of the Ericsson PRS "TAC" team. With a swish of his magic fingers, Ben instantly made my Phoenix SX move from some frequency up above 155 MHz down into the packet frequencies.

Here's another good part of this story: The radio makes 40 watts at 155 MHz, and after the move to 145 MHz, it is still making 40 watts.

For the last seven years most of my operation has been at 145.770 MHz on the Southeastern Emergency Digital Association Network's frequency. The SEDAN covers 11 states. The 1200 baud user ports are on 145.770 MHz, and the backbone at 9600 baud is at 6 meters. It's a great combination and it works great!

If you are into the crystal version of the Phoenix, crystals are $15 each ($30 a pair) from JAN Crystals. When you call JAN Crystals, ask for Sue Brick. She keeps a well-defined database on almost all the Ericsson & GE radios.

The TNC interface connections are easily made at the rear of the Phoenix. Tune up of the Phoenix is about as easy as any radio I've modified to date. When you do the initial tune-up, you may find that most of the frequency-sensitive coils require only a slight touch-up.

If you try to take the Phoenix below 145.000 MHz, you may find that the frequency, power, and receive response curve begins to fall off rapidly. This is not a concern with the packet frequencies above 145 MHz, though, since there is still room to make the final tweaks to bring the power level to specs and the receiver sensitivity better than 0.3 uV.

Enter, The Interface

Our task is made easy as we connect the transmit AFSK from the TNC, the receive audio from the filtered Vol/Sq "HI," and connect the push-to-talk line. All this is done at the rear of the Phoenix at the radio's rear connectors, P910 and P911.

In other radios I usually take the TNC receive audio from the wiper of the volume control. In the Ericsson/GE service manual we find a couple of receive audio pick-off points. One that best suits our application and has ample audio to drive the TNC-2 type node is at "FLTRD VOL/SQ HI." It is clearly marked in fig. 1 as pin 4 of P910.

In the case of the Phoenix we have another ready-made TNC receive audio interface point at pin three (3) of connector P910. Use the pin three receive audio

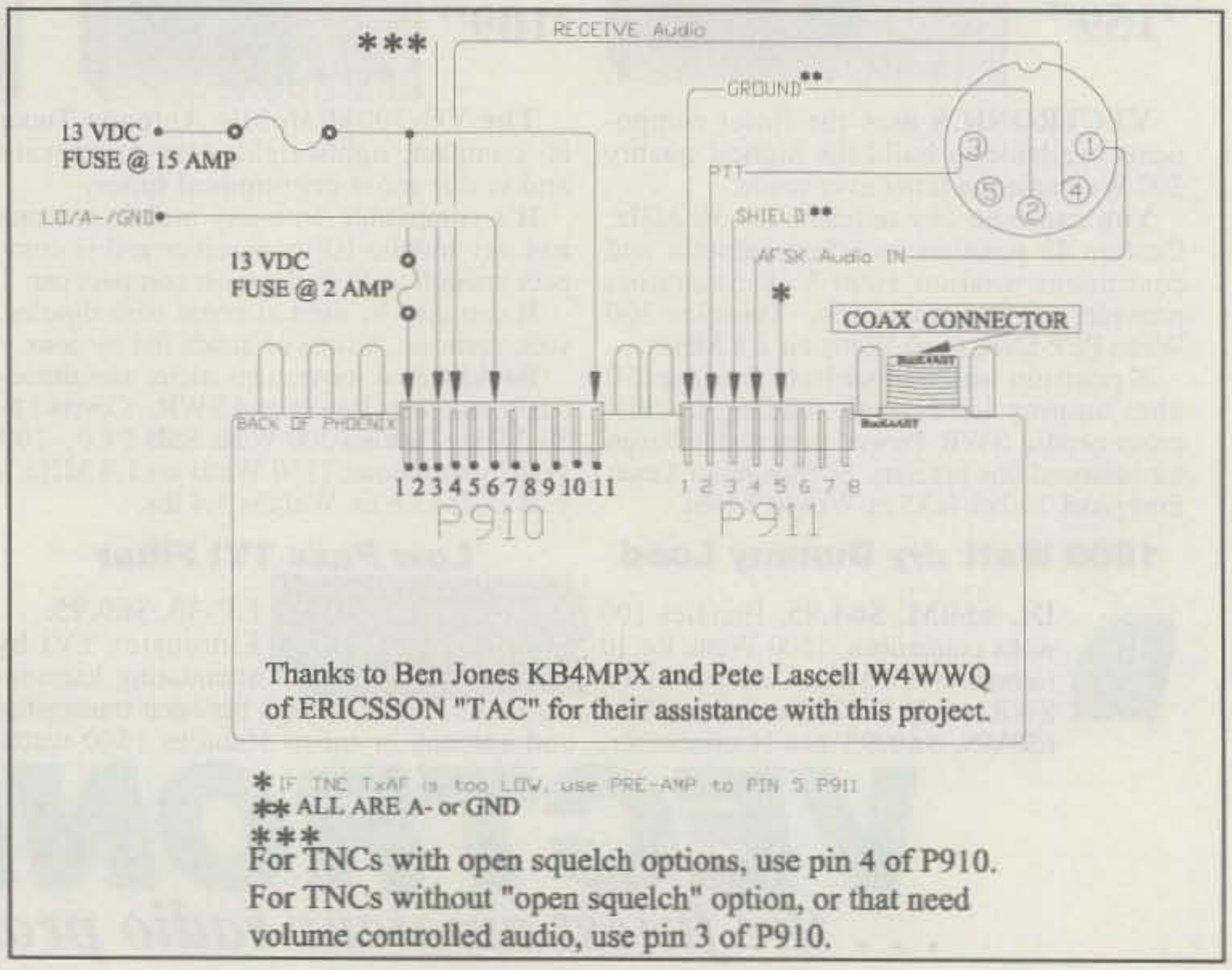

Fig. 1– Modifying the Ericsson/GE Phoenix for packet use.

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e-mail: K4ABT@PacketRadio.com

Say You Saw It In CQ

point if your TNC requires "volume controlled, squelched audio." If you are using the Phoenix in node service with the "B" version, or the later model MFJ-1270CQ or "CQ Turbo," then use the fixed audio level output at pin four (4) of connector P910 (see fig. 1).

The filtered audio at connector P910, pin 4 makes for much easier packet decoding, as it does not contain the low frequency distortion that is often found in discriminator audio taps.

The transmitter interfacing of the Ericsson/GE Phoenix is pure and simple, since the transmit audio is true frequency modulation.

For the transmit audio, again, there are two inputs available; standard transmit audio may be fed at pin 4 of P911. This is the microphone "standard" input, and where I make my TNC AFSK input. I adjusted the TNC level and the radio's deviation control for 3.5 kHz (1200 baud) maximum deviation. At this level, the transmit audio is clean and easy to decode at the target end.

If your TNC has low AFSK output, then you may choose to use the "pre-amped" input at connector P911, pin five (5).

Interfacing the 9600 Baud TNC/Node to the Phoenix

If you plan to operate the Pheonix at 9600 baud, then make sure all I/O connections for the transmit DFSK and receive audio are kept separate. Use small shielded coax similar to the RG-174 coax MFJ uses inside the TNC to cable the 9600 baud modem to the internal TNC, 5-pin, DIN connector.

A Final Word

The Ericsson/GE Phoenix makes an ideal transceiver for use at the home QTH or on a mountaintop. The internal RF filtering (sharp front end) makes this transceiver an ideal radio for mountaintop node use.

Very often I find another way, a better way, or even another helpful idea that supports the modification that we've covered here in the "Packet User's Notebook." In that case, the idea may be too short to build into another column, but the function is important enough to add to the previous mod. When this happens, I usually add the update to the modification and then place it on either the 9600 baud mods page or the radio modifications page at the <www.PacketRadio.com pages>. To view the updates from previous packet radio articles, go to the TNC and networking mods and interfacing at: <http://www.packetradio.com/network.htm>. In order to view the updates from previous radio mods for 9600 baud, go to <http://www.packetradio.com/9k6.htm>.

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CIRCLE 71 ON READER SERVICE CARD

BY IRWIN MATH, WA2NDM

MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

Battery Backup

Several months ago we presented a couple of ways to add a battery backup circuit to equipment you might be building. These schemes relied on reverse and forward biased diodes to switch between the AC line derived power source and the backup battery. One such circuit is reproduced in fig. 1 to jog your memory. While this type of method is simple and does work, it is less than ideal in the sense that the drop across the diodes subtracts from the voltage available from the backup battery. This means that in backup operation, every "last drop" of power cannot be obtained—an unallowable situation in the eleventh hour of Field Day! In addition, it requires that the incoming voltage must be higher than the backup battery in order to switch properly.

What if you wanted two backups? Or what if your two sources were equal-voltage car batteries? Well, for those of you who wish to go further, the approach to be described this month centers around a new chip offered by Linear Technologies that is specifically designed for backup service. As you soon will see, the shortcomings of the previous method are easily overcome with this new chip.

Fig. 2 is a schematic diagram of a battery backup system using the new Linear Technologies LT1579. As you can see from the schematic, the chip has two inputs. Vin 1 is for the primary source of power, and Vin 2 is for the backup battery input. When initially turned on, the regulated 5 volt output is provided from the source connected to Vin 1. When the circuit senses that Vin 1 has dropped to the point where it can no longer sustain a 5 volt output, the chip then switches to the backup input source connected to Vin 2. The chip operates in this manner whether Vin 1 is larger or smaller than Vin 2. Vin 1 is always the primary, and Vin 2 is always the backup.

The LT1579 also contains two voltage comparators for status monitoring purposes. These comparators, S1 and S2, are driven by voltage dividers that are user-set for the desired sensing levels. In the example of fig. 2, the primary comparator (S1/Comp 1) is set to sense 5.4 volts, and the secondary comparator (S2/Comp 2) is set to sense 6.2 volts. When these levels are reached, the outputs, which are open collectors, conduct. Usually these outputs are pulled up to Vcc and used to provide signals for switching other circuitry. One common application of this type of signal would be to disconnect batteries that must not be allowed to totally discharge.

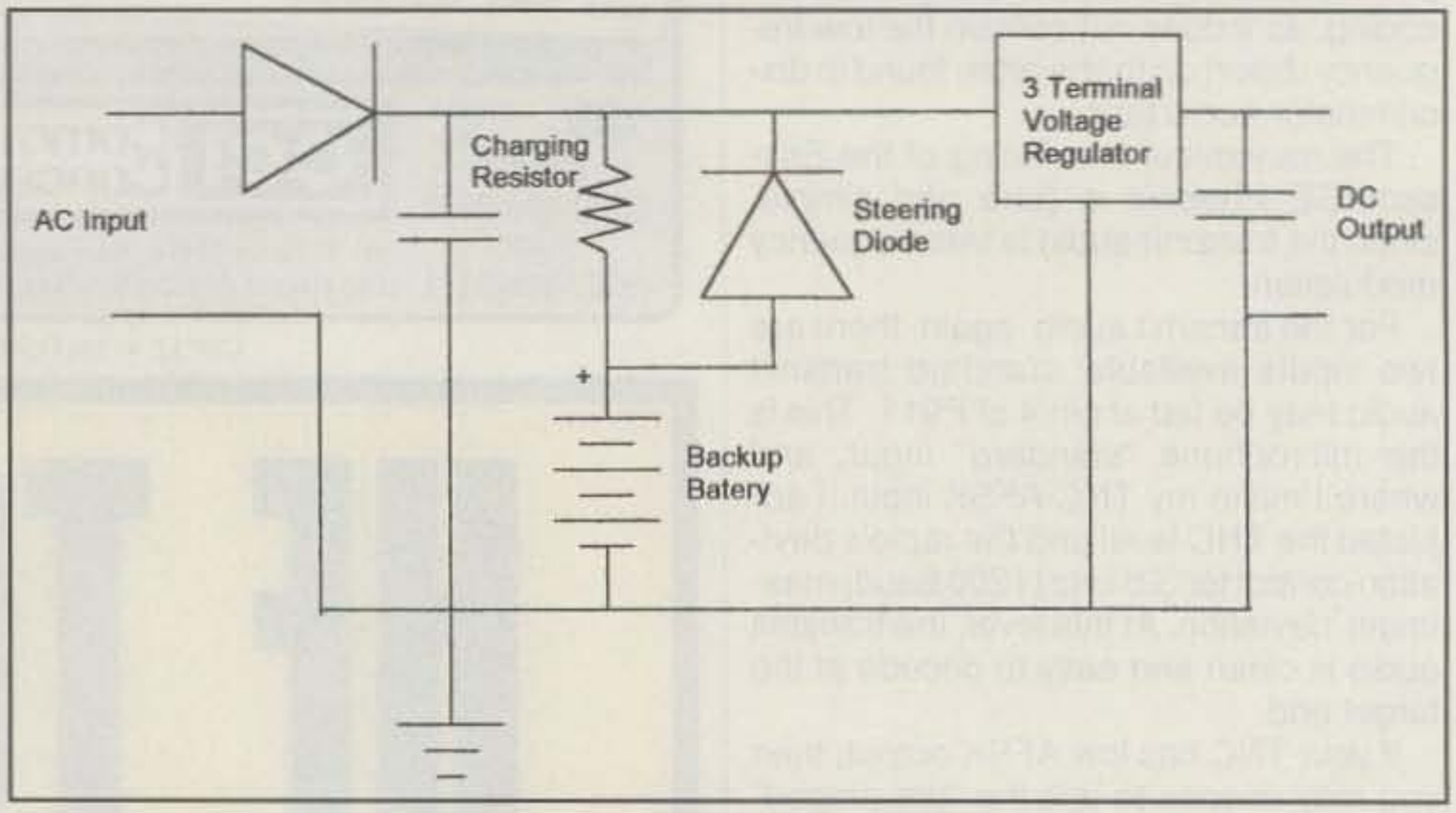

Fig. 1– Reference battery backup/regulator circuit.

The two other outputs shown in fig. 2 are B/U and D/O. B/U is called "backup" and conducts when the LT1579 switches from the primary to the secondary input. D/O is similarly called "dropout" and conducts when there is not enough voltage from either source to sustain the 5 volt output. These can also be used for indicator purposes or for other power management circuits.

Additional features of the LT1579 chip include a regulated output, an input to output drop of only 0.4 volts, and input reverse polarity protection. This means that primary or secondary inputs only 0.4 volts higher than the output (5.4 volts) will drive the circuit, allowing every last drop of power to be obtained from a battery. It also means that if you accidentally connect the battery with the wrong polarity, nothing will be damaged.

In conclusion, the LT1579 seems to be the ideal backup controller. For further information, contact Linear Technologies at 1630 McCarthy Blvd., Milpitas, CA 95035-7417, or call their literature "hot line" at 1-800-4-LINEAR.

73, Irwin, WA2NDM

c/o CQ magazine

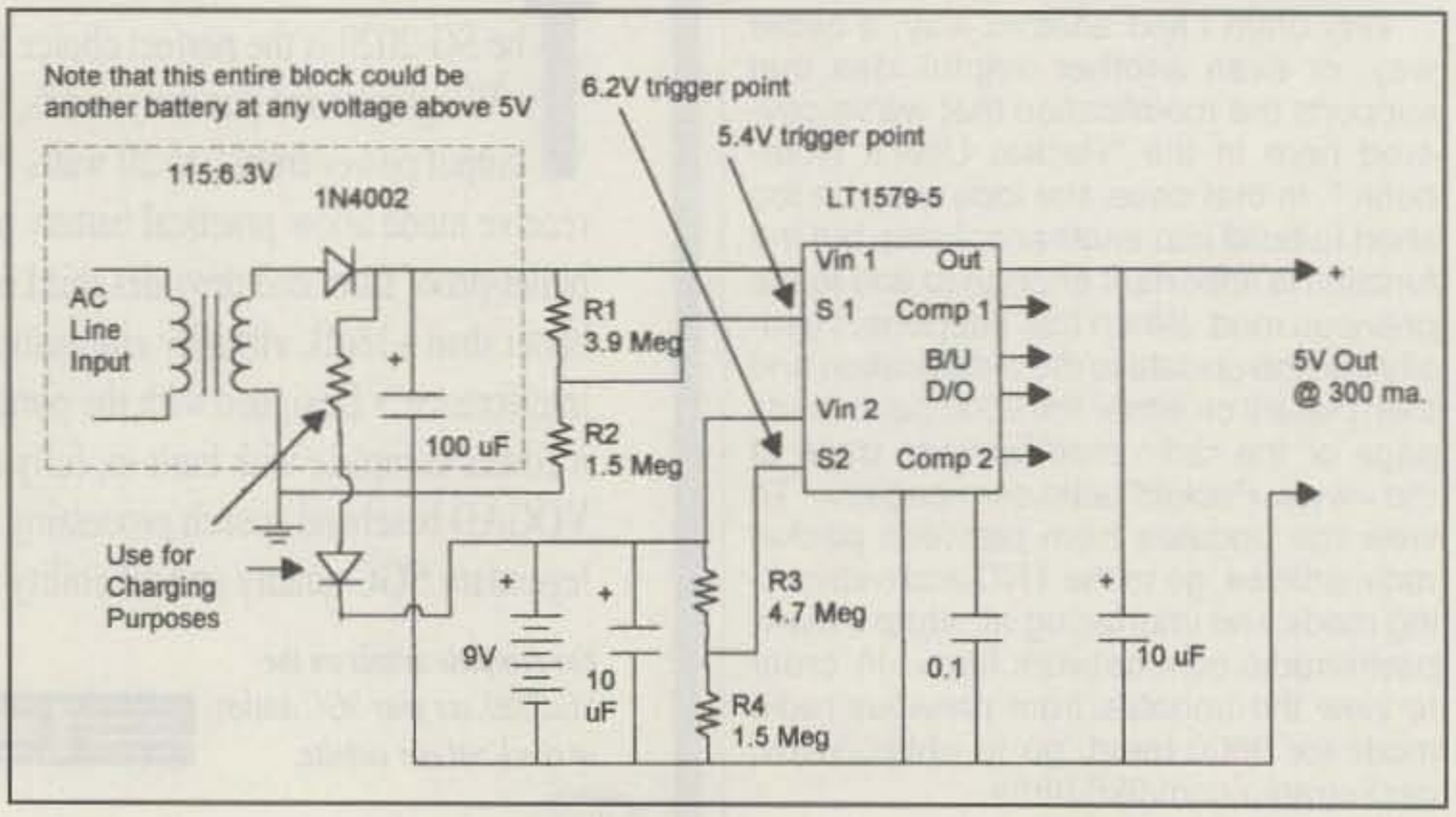

Fig. 2– Battery backup circuit using National LT1579.

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CIRCLE 165 ON READER SERVICE CARD

BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

Locating Your Grid Locator

You're new to the VHF weak-signal operating. You hear everyone saying that their grid square is such and such. You're confused because you don't know what a "grid square" is or what yours is. If I'm describing you, then read on for an explanation of what they are, where they came from, and why they are so popular today.

More than forty years ago a system of grid locators was introduced in Germany as a way of spurring activity on the VHF+ amateur bands. These locators were assigned two-letter designators. Initially, the system worked well enough for the areas it covered in Europe and North Africa. However, worldwide expansion of the system necessitated replication of the same two-letter designators in other geographic areas, causing obvious confusion.

Two amateurs, working independently of each other to alleviate this problem, developed nearly identical designator systems. The first was created by Folke Rosvall, SM5AGM, in October 1979. The system started at the principal dateline and involved 20° by 10° large units, 2° by 1° middle units, and 6' by 3' small units (the measurement is in minutes, not feet).

The second, developed by Dr. John Morris, G4ANB, in December 1979, also involved 20° by 10° large units and 2° by 1° middle units. However the small units were 5' by 2.5'. The proposed starting location for his system was the Greenwich longitude.

In April of the following year, a group of European VHFers met in Maidenhead, England. Among the twenty or so proposals presented, Rosvall's and Morris's surfaced as the front runners. The group determined that the best solution would be to modify Morris's system to start at the principal dateline.

The U.S. Awards System: Meanwhile, the activity stimulated by use of the grid locator system in Europe prompted amateurs in the United States to take a look at developing a system for North America. At the 1981 Central States VHF Society conference held in Sioux Falls, South Dakota, the Committee on Society Awards (headed by Lance Collister, ex-WA1JXN, now W7GJ) proposed a series of three awards. The first was for making 100 contacts on VHF, the second was for making contacts in 100 1° by 1° grid locators, and the third was for scoring 1,000 points by working stations at increasing distances from one's home QTH. Distances were measured on the basis of 1° by 1° grid locators. The proposal was adopted, and the awards were put in place and publicized. In the months that followed activity on VHF+ increased, and a few awards were issued.

VHF Plus Calendar

May 3	First quarter Moon. Good EME conditions.
May 7	Moon Apogee.
May 10	Poor EME conditions.
May 11	Full Moon.
May 14–17	Dayton Hamvention.
May 15	Lowest Moon declination.
May 18	Last quarter Moon.
May 23	Moon Perigee.
May 24	Moderate EME conditions.
May 25	New Moon.
May 27	Highest Moon declination.
May 31	Good EME conditions.

**EME conditions courtesy W5LUU.*

Back in Europe, however, plans were being implemented to adopt the modified Morris plan—now called the Maidenhead Grid Locator system. Officials in the three International Amateur Radio Union (IARU) regions were contacted about adopting the plan within their respective regions. Region 3 was the first to adopt the plan in 1982. Region 2 followed in 1983. Then finally, in April 1984, Region 1 adopted the Maidenhead Grid Locator system, with an implementation date of January 1, 1985.

With interest in the CSVHF Society awards program increasing, the American Radio Relay League (ARRL) formed an Ad Hoc committee to study the adoption of a League-sponsored awards program as a possible replacement for the CSVHF Society awards. During 1982 the committee, working closely with members of the board of CSVHF Society, developed the VHF/UHF Century Club (VUCC), which incorporated the 100-grid concept. Seeing that the future lay in the Maidenhead locator system, the committee designed the program around it.

In January 1983 an article in *QST* by then Communications Manager John Lindholm, W1XX, announced the implementation of the awards program. Although the rules weren't spelled out entirely in the article (the rules for the higher microwave frequency awards were still being developed), a starting date of January 1, 1983 was set. Readers were encouraged to send for copies of the rules and application blanks. These can be found on the ARRL's home page <http://www.arrl.org/awards/vucc>. The awards provided for decreasing requirements on increasingly higher frequencies. On both 6 and 2 meters, the number of required grid locators to be worked was 100. On 125 and 70 cm, 50 grids were required. Operators on 902 and 1296 MHz needed 25 grids each. As the rules developed, requirements were spelled out for the higher bands. On 2.3 GHz the requirement was 10 grids. On 3.4 GHz and above amateur bands, the requirements were 5 grids. The recipients would receive *half century* awards for contacts on 125 (now 135) and 70 cm. For all bands above 70 cm, the recipients would receive *quarter century* awards. Initially, no award was offered for repeater or satellite contacts. However, on September 1, 1992 an award was created for working 100 grids via satellites. Endorsements are also available for working more grids on a particular band. However, no other endorsements (such as for mode or propagation path) have been authorized.

The awards require a fee of $10 for the initial application for each band, or for the satellite award. Subsequent endorsements require a fee of $2 ($4 foreign). If you are a United States or Canadian applicant, you must have your QSL cards field checked by an official from an ARRL Special Service Affiliated Club, or the Radio Amateurs of Canada equivalent. To obtain a list of field checkers near you, send a letter and an SASE to the American Radio Relay League in the U.S., or to the Radio Amateurs of Canada in Canada. Foreign applicants must have their QSL cards field checked by a designated official in their country.

Interestingly enough, while this awards program was designed to supersede the CSVHF Society program, it has done so only in *popularity*, as the CSVHF Society awards still exist today. However, according to Kent Britain, WA5VJB, one of the board members, no one has applied for any of the awards in the past ten years, and it's doubtful the mechanics would be in place to issue any if someone were to do so.

The VUCC program was an instant suc-

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Say You Saw It In CQ

cess, and the race was on to see who would be first to attain the award on each band. Keeping in step with the change, the June 1985 VHF QSO Party rules switched from sections to grid locators as multipliers, creating a whole new scoring procedure.

Leaders were still based on sections and divisions. Point accumulation, however, was based on the grid locator, with its relatively uniform size, rather than the arbitrary size of different sections. Suddenly, a grid locator had the potential of becoming more rare than Delaware. Amateur operators made efforts to be "in demand" by operating from one of these rare grid locators.

Over the years, because of the fleeting nature of VHF+ contacts, the grid locator has come to replace both the QTH and signal report information as the exchange for many VHF+ QSOs (the exception being meteor scatter and EME contacts, which still use a modified signal report system). However, this has not eroded what is considered a legitimate QSO. VHF+ operators have maintained a high sense of ethics. An operator agrees that he or she must hear both callsigns and the grid locator (or signal report on meteor scatter and EME QSOs), along with an acknowledgement from the other operator that he or she has also received the same information, in order for the QSO to be considered complete.

It is well accepted that if one operator hasn't received all the information necessary, the contact is incomplete and both operators will wait for another time to repeat the attempt. The "exchange a signal report only" type of QSO so prevalent on HF operations, and particularly on some DX nets, is rarely found on VHF.

Determining Your Grid Locator: The grid locator designator has up to six places, two letters followed by two numbers, followed by two letters. The starting grid field, the 20° by 10° large unit, begins with "AA." It's located between 180° and 160° W and 90° and 80° S. The next field "AB" is also found between 180° and 160° W, and is located between 80° and 70° S. Each successive field in that column is ten degrees farther north, and is designated by an increasing second letter; the most northerly field is designated "AR." The next field to the east repeats the alphabetical sequence with the designator "BA," and continues the same progression north. The final field, found at the opposite corner (between 160° and 180° E and 80° and 90° N), is designated "RR."

Determining your grid locator location within the grid field is simply a matter of finding your longitude and latitude. There are one hundred 2° by 1° grid locators in each grid field. (Actually, these locators are more commonly referred to as locators, as a throw back to the old CSVHF

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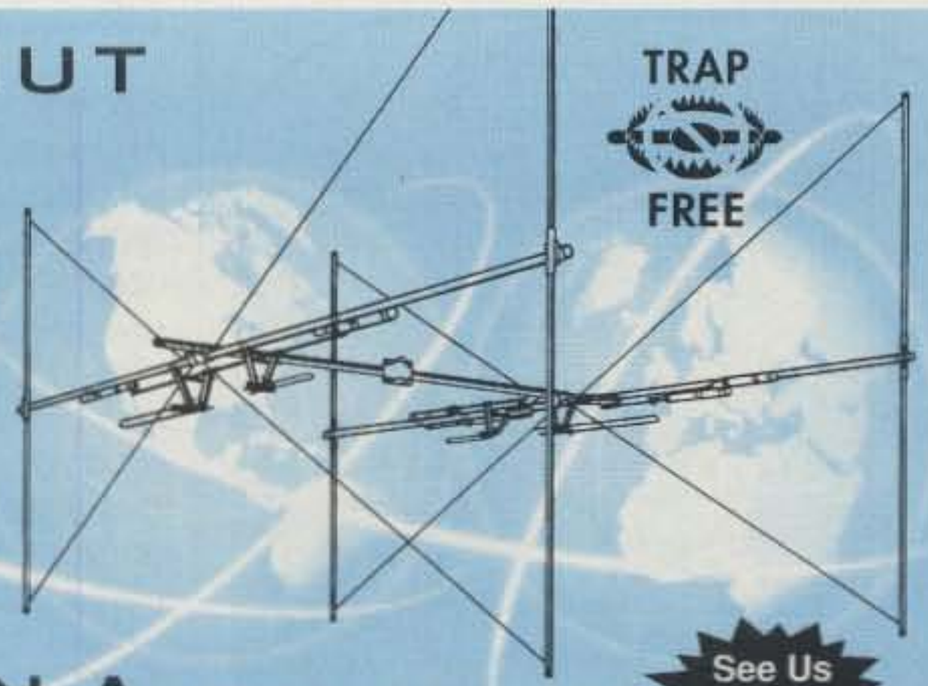

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Society 1° by 1° system which, because of their equal degree dimensions, got mislabeled as squares. Unfortunately, the name "square" stuck.) Grid locators are numbered between "00" and "99." The lowest number is located at the southwest corner of the grid field, and the highest number is located at the northeast corner. Find your 2-digit number by counting how many degrees you are located east and north of the southwest corner. For example, if you're located within 100° and 80° W and 40° and 50° N, you are within grid field EN. If you're located between 96° and 94° W and 43° and 44° N, count one locator for each 2 degrees east of the corner and one locator for each 1 degree north of the corner. In this example, you'd be two locators east and three locators north of the corner—within grid locator EN23, or somewhere in northern Iowa or southern Minnesota.

Things get a bit more complicated if you want to figure out your exact designator. You must know your location down to the last 2.5 minutes. If your starting point is an even degree, increase the first letter by one increment for each 5 minutes of your degree intersection, beginning at the letter "A." If your starting point is an odd degree, increase the first letter by one increment for each 5 minutes east of your degree intersection, beginning at the letter "M." For each 2.5' north of your degree intersection, increase the second letter by one increment. In neither the longitude nor the latitude designations will you find a letter beyond "X." Again, in the above example, if the location fell between 95° 20' and 95°25' W, and between 43° 15' and 43° 17.5' N, your grid locator would be EN23QG, and you would be located very near, if not at, the four-corner intersections of Osceola, Dickenson, O'Brian, and Clay Counties in Iowa. The last two letters are rarely used in North America, except to indicate much more accurately the locations in order to measure distance records (and then principally on the microwave bands). It's important to note that the system of finding your fifth and sixth designators is reversed when you are south of the equator and/or when you are east of Greenwich longitude.

Those who don't want to bother figuring out their location and looking it up in an atlas can purchase a couple of aids from the ARRL. The *ARRL Grid Square Map for North America* is available for $1, plus a business-size SASE. The *ARRL World Grid Square Atlas* is available for $5, plus $1 shipping and handling. The *Atlas* includes documentation for a BASIC program you can use to calculate your grid locator. Both items can be purchased directly from the League and may also be available at your local amateur store.

If you have a computer, there are various home pages where you can convert either from either. Among them is the League's <http://www.arrl.org/locate>.

Determining Your Correct Longitude and Latitude: Finding out where you are on the Earth can be a bit of a challenge. There are two ways—the easy (but considerably more expensive) way and the slightly more difficult (but considerably cheaper) way. The easy way is to find someone with a Global Positioning System (or GPS) receiver. With one of these devices you can determine your longitude and latitude with a fair degree of accuracy.

These receivers rely on signals transmitted from at least three of the 24 satellites that are in synchronous orbit approximately 11,000 miles above the Earth. The GPS receiver must receive a minimum of three of these satellites to obtain the necessary signal to produce a two-dimensional location, which will allow the circuitry in the unit to calculate your location. However, it takes a minimum of four satellites for accurate triangulation information. Some receivers are able to pick up signals from six or more satellites.

There are several handheld models on the market from around $300 up. Some of them have the grid locator system built into their software. Acquire one of these models, and your problem of finding out where you are in terms of your grid locator is solved.

You can use the U.S. Geological Survey 7.5 minute series topographic maps to plot your grid locator, but this is a slightly more difficult method. These maps are called 7.5 minute series because they cover an area 7.5' by 7.5'. They are available from the U.S. Geological Survey Centers in Denver, Colorado 80225 or Reston, Virginia 22092, or from the Oklahoma Geological Survey Center, Norman, Oklahoma 73069 or your local map store. I purchased mine from the local map store for $3 per map. Incidentally, the local map store is probably your best bet, because each map is named and if you don't know the name of the map, you can at least look through their selection until you find the one you want.

Once you've acquired the right map, simply look for the correct location and read the scale on the side of the map to determine your longitude and latitude. For my QTH the map is called "Britton, Oklahoma." I looked up my QTH and determined that I was approximately 1200 feet west of the 97° 32' 30" mark and 5200 feet north of the 35° 30' mark. The 97° by 35° indication places me within grid locator EM15. By a bit of interpolation and drawing on the map, I could see that I was within the 5' by 2.5' location bounded by 97° 30' to 97° 35' by 35° 30' to 35° 32' 30", which places me within the sublocator of "fm." So, my grid locator is EM15fm.

Incidentally, once I knew my longitude and latitude, I could have plugged them

into one of the software programs mentioned above and had it calculate my grid locator for me.

Why are Grid Locators so Popular? The quest for completing contacts with stations in different grids rivals that of county hunting on HF. To economize on space and time, anyone who wishes to go on a grid expedition will probably also want to put on as many grids as possible. Pat, W5OZI, Nick, W5FUA, and John, KB5IUA (now K5IUA), held their 1992 grid expedition at the exact intersection of DM70, DM80, DL79, and DL89. The 1992 Chip Angle, N6CA, grid expedition took place at the exact location of the four corners of DM05, DM06, CM95, and CM96. The ARRL allows this sort of expedition, as long as the exact intersection can be determined by physical means. In both of these cases, the operators had the benefit of a survey marker.

Looking Ahead: What is the future of the grid locator system? As an incentive for activity, it still presents a challenge. There are 32,400 grid locators in the world. To date, Fred Fish, W5FF, has worked the most grids—over 750. Fred has also worked all of the grids in two fields. Even so, his total accumulation represents only 2.3 percent of the total locators available. So even for the leader, there's still plenty of challenge left. When the VHF+ operators, who fled the bands for 10 meters because of the "easy" DX, return again, there will be even more active stations to work from different grid locators.

APRS Shift Taking Place

The following is from the March 13, 1998 "ARRL Letter": "The great APRS shift underway: Paul Knupke, KR4YL, of Pinellas County, Florida reports that the Tampa Bay and Sarasota County areas of Florida have completed the switch to 144.390 MHz for APRS operations as of March 1. A number of other areas of the Florida peninsula are expected to switch this spring, but there is no word yet on the Jacksonville and panhandle regions. The Greater Boston area, New Hampshire, and southern Vermont are set to make the switch on May 3, and Connecticut and Rhode Island are expected to join them. Hams in northern Arkansas also have announced plans to move by mid-May, but no coordinated effort has been announced. In Branson, Missouri, a new APRS digipeater is set to hit the air in early May on the new 144.39 MHz frequency."

AMSAT Issues a Call for Papers

The following is from the March 13, 1998 "ARRL Letter": "A call for papers for presentation at the 16th Space Symposium and AMSAT Annual Meeting has been issued. The conference will be held Octo-

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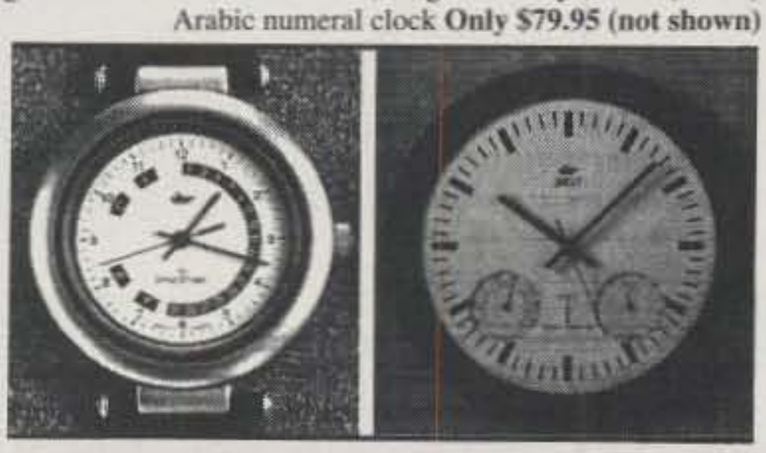

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CIRCLE 37 ON READER SERVICE CARD

ber 16–18, 1998, at the Park Inn International, Vicksburg, Mississippi. This is the first call to authors who wish to present papers at the symposium which will be printed in the Proceedings. Subject matter should cover topics of interest to the Amateur Radio satellite service. One-page abstracts are due by June 1, 1998, and authors will be advised shortly after June 15, 1998 whether their papers have been accepted. Camera-ready copy of accepted papers is due by August 15, 1998. Papers generally will be printed as submitted. Send abstracts to Malcolm Keown, W5XX, 14 Lake Circle Dr, Vicksburg, MS 39180; e-mail <w5xx@magnolia.net>. If sending an abstract by e-mail, please follow up with a postal mail copy. Authors may submit files in any version of Word or WordPerfect. Proceedings of the Symposium will be printed by the ARRL and made available at and after the meeting. For more conference information, see <http://pages.prodigy.com/DXHF93A>."

Current Conferences

Dayton: The weak-signal program for the Dayton Hamvention was not available at press time. However, there is expected to be a discussion related to making band plans mandatory by FCC regulation. I do have information on the Weak Signal VHF Group banquet. The information follows:

VHF Weak Signal Group: The VHF weak-signal group that meets Monday nights at 0200 UTC on 3.843 MHz would like to invite everyone who is coming to the Dayton Hamvention to its annual banquet. However, you must act quickly, as last year's banquet was a sellout. For more information on the banquet, look it up at <http://www.wa8wzg.com>.

I regret that I will not be at Dayton this year. I have a good excuse, however. I am graduating from seminary on Saturday, May 16!

1998 SMIRK Contest Rules

The following is from Pat Rose, W5OZI: "The SMIRK QSO Party, sponsored by the Six Meter International Radio Klub will be held from 0000Z June 20, 1998 through 2400Z June 21, 1998. Contacts must be on 6 meters only, voice and/or CW. No contacts involving another band for one side of the contact count. One need not be a SMIRK member to take part.

"No contacts between stations in the 48 contiguous U.S. states and lower tier Canada (VE1 through VE7) are allowed between 50.100 and 50.125. Only contacts with and between stations outside of these areas may take place in this band segment.

"All contacts must be made by a single operator. There is no multi-operator category in this contest. Exchange is callsign, SMIRK number, if the station worked has one, and grid. Partial contacts in which one of the above pieces of information is missing do not count.

"All contacts must be made via natural propagation. No contacts using repeaters, or any manmade device for relaying transmissions are allowed. Exchange is callsign, SMIRK number, if station being worked has one, and grid. All participants must observe the rules governing amateur radio operation in the participant's country.

"Scoring is as follows: Count 1 point for each completed contact. If station worked provides a SMIRK number, multiply by 2. In addition to the SMIRK number multiplier, the following additional multipliers apply: For participating stations located in the 48 contiguous U.S. states and VE1 through VE7, a multiplier of 2 should be applied to all contacts made above 50.2 MHz. For participating stations located outside of the 48 contiguous U.S. states and VE1 through VE7, a multiplier of 2 should be applied to each contact no mater where in band the contact is made. For participating stations located in the 48 contiguous U.S. states and VE1 through VE7, a multiplier of 2 should be applied to each contact made with stations located outside of these areas no matter what part of the band the contact takes place. A station can be worked only once for score, but contacts may be made below 50.2 for the purpose of QSYing above 50.2 MHz to obtain 2 multiplier.

"Certificates will be issued to the highest scoring SMIRK member, submitting a valid log, in each ARRL Section, the Maritime Provinces and each of the remaining Canadian provinces and each other DXCC country. If no entries are received from SMIRK members in any of these geographical divisions, a certificate will be awarded to the non-member entrant submitting the highest valid log from that area. In order to be counted, logs must be sent to the above address and postmarked by 1 August, 1998. Final score is contact points times grids worked. New log forms incorporating this scoring system are available from W5OZI at the following address: Pat Rose, W5OZI, P.O. Box 393, Junction, TX 76849, or on the SMIRK Web site at <http://www.6mt.com>.

"For the purpose of this contest, a

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SMIRK member is anyone who has ever been issued a SMIRK number, whether or not he or she has paid dues in recent years. Of course, all 6 meter operators are encouraged to join SMIRK or renew. Renewals may be obtained by sending $6 to the above address, noting the SMIRK number. Anyone not a member may join by sending a list of six SMIRK members worked on 6 meters, along with $6 to the above address. An attempt will be made to issue a SMIRK number to each new member applying in time to fully participate in this year's SMIRK QSO Party.

"SMIRK members as well as non-SMIRK members are invited to take part in this fun event. Why not give it a try?"

Feedback

In response to the March column, Chip Angle, N6CA, sent the following: "On January 31 of this year the SMIRK staff members met. As a result of this meeting they (finally) issued a very strong statement of support for the 100 kHz DX window from 50.100 to 50.200 MHz. Many of us on the West Coast have supported the 100 kHz window since its initial inception. I surely hope that you will give it strong support as well in your column."

And Finally . . .

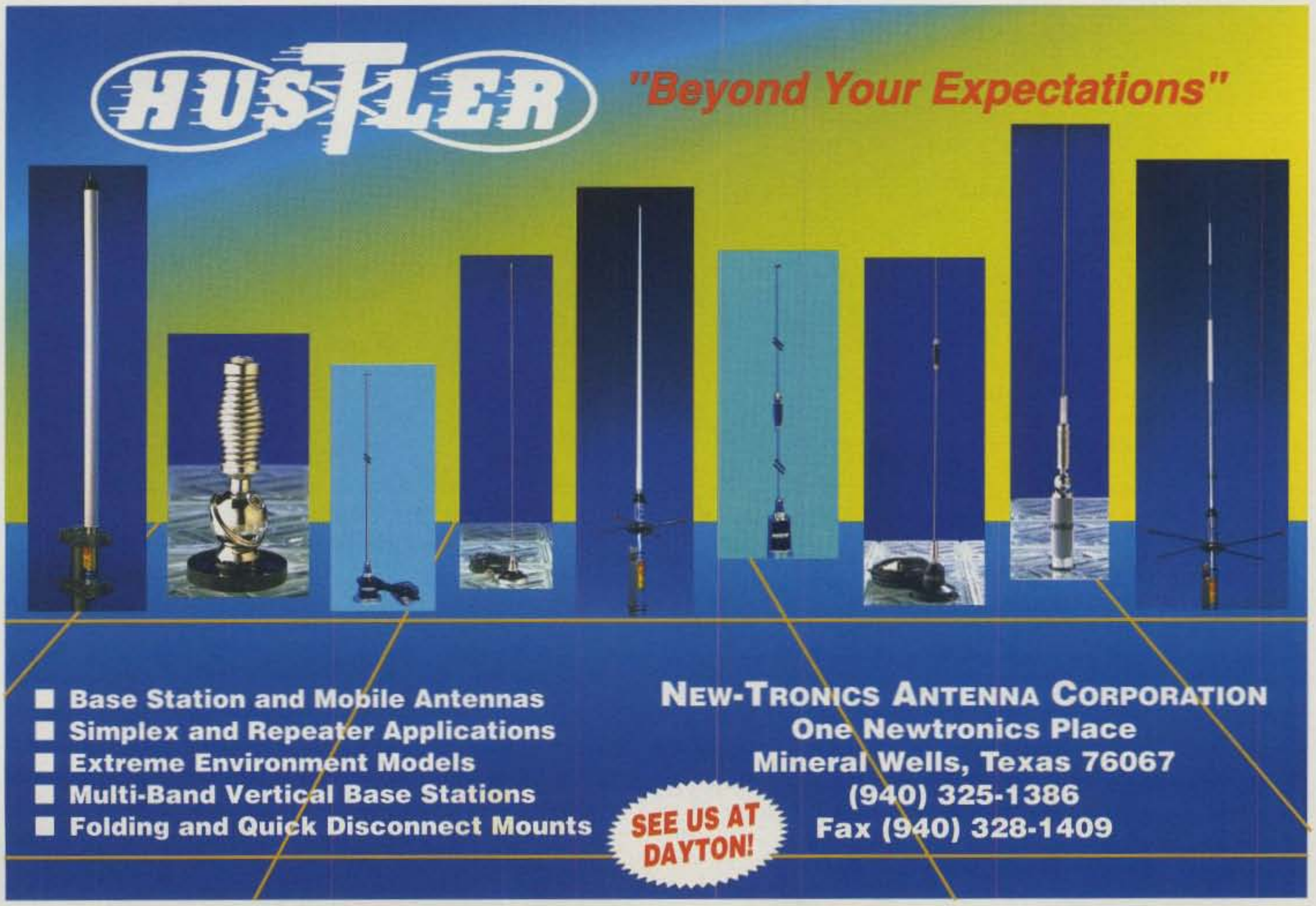
Two months ago I spoke of the necessity for us to work together in cooperation with regard to the use of our frequency spectrum. It seems that I am constantly preaching this same message in this column. In a small way I feel like the new preacher who, Sunday after Sunday, preached the same sermon. The church board, thinking that because he was new he didn't have much in his inventory of sermons, was concerned about him. Finally, the board chairman asked him several weeks into his repetition why he was preaching the same sermon. He replied that he was going to preach it until he got it right.

You might have caught that there is a double meaning in that story (meaning until the congregation responded). From my observations on the amateur bands and the Internet, I have to conclude that either I am not preaching my message of cooperation right or the members of my congregation (you) are not getting the message. To reiterate, ladies and gentlemen, we have major problems. We are not replacing our ranks. Additionally, within our ranks is so very much divisiveness over such puny issues. Plus, when we fight, we really get nasty. Furthermore, our on-the-air activity continues to degenerate.

A good example of the fallout from that last point was illustrated in the March 1997 issue of *QST*. In a letter to the "Correspondence" column, Rick Wallis, KA4VHV, wrote about how he was gently coaxing his wife into the hobby. He got her to the point of buying a study guide. Then, unfortunately, one evening they happened to tune into the 75 meter phone band. After they listened to several QSOs of less than dubious nature, Rick turned the receiver off and his wife tossed the study guide into the trash. While Rick's point was directed at Extra class operators they heard, we all easily can find examples within any class of license in our ranks.

Fortunately, Rick's story has a happy ending. Eventually the license manual was retrieved and Rick's wife became licensed. Even so, it took a great deal of unnecessary diplomatic work to bring her into the ranks.

To reiterate: My friends we have problems that only we can solve—and we must do so immediately. For the time being, however, I will continue to preach the same sermon until I get it right. Until next month . . . 73, Joe, N6CL



CIRCLE 65 ON READER SERVICE CARD

CQ World-Wide WPX CW Contest All-Time Records

The contest is held each year on the last full weekend of May. The All-Time Records will be updated and published annually. Data following the calls: year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	4X4NJ('96)	259,420	170
3.5	EA8/OH2KI ('96)	1,358,852	347
7.0	LU1IV('97)	7,671,456	702
14	YW1A('91)	4,617,456	732
21	ZD8LII('91)	5,118,527	743
28	ZS6BCR('91)	3,621,173	617
AB	P4ØW('94)	14,168,115	845

Multi-Operator Single Transmitter

	CQ3X('95)	13,254,620	790

Multi-Operator Multi-Transmitter

	9A1A('97)	17,925,084	1076

U.S.A. RECORD HOLDERS

Single Operator

1.8	K1ZM('95)	40,446	107
3.5	K1ZM('93)	406,080	288
7.0	KI1G('96)	2,573,408	587
14	KI1G('95)	3,330,088	788
21	K6LL/7('88)	2,163,388	557
28	N5RZ('89)	162,134	259
AB	KE2PF('97)	7,032,033	779

Multi-Operator Single Transmitter

	NB1B('96)	6,256,128	768

Multi-Operator Multi-Transmitter

	KG1D('97)	12,361,680	944

CLUB RECORD

Northern California Contest Club ('92) 97,527,906

QRPp RECORD

P40W('97) 4,018,208

WPX (Prefix) RECORD

HG73DX('91) 1120

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	ZS4FO('95)	4,464	24
3.5	EA8/OH2KI('96)	1,358,852	347
7.0	AM9TY('92)	2,007,990	404
14	ZD8LII('93)	2,687,580	567
21	ZD8LII('91)	5,118,527	743
28	ZS6BCR('91)	3,621,173	617
AB	3V8BB('97)	11,884,728	778

ASIA

1.8	4X4NJ('96)	259,420	170
3.5	UP2NK/UF('85)	701,012	221
7.0	9K2ZZ('94)	3,383,676	487
14	4Z6DX('91)	4,614,030	743
21	7L1GVE('91)	2,811,478	601
28	4X4UH('81)	1,081,262	338
AB	P31A('92)	10,293,858	762

EUROPE

1.8	SP5GRM('97)	249,516	261
3.5	LY2BTA('96)	967,974	399
7.0	UA6LAM('96)	3,760,164	701
14	CT2A('95)	4,231,598	826
21	4N4A('88)	2,585,460	615
28	9H1EL('88)	805,552	398
AB	GIØKOW('97)	6,325,953	813

NORTH AMERICA

1.8	VE3BMV('86)	43,428	77
3.5	FM5BH('97)	833,490	315
7.0	V26BA('97)	6,227,550	659
14	ZF2NE('97)	4,122,334	706
21	FS5T('89)	4,552,470	702
28	HI8JKA('89)	891,242	374
AB	VP5GN('97)	10,675,330	794

OCEANIA

1.8	KX6DC('88)	12,240	45
3.5	KX6DC('89)	258,258	143
7.0	V7A('93)	2,205,922	373
14	N6VI/KH7('95)	3,103,932	606
21	N7DF/WH2('89)	3,243,450	525
28	KG6DX('81)	1,238,806	334
AB	DX1EA('95)	5,942,342	602

SOUTH AMERICA

1.8	YV1OB('86)	11,550	35
3.5	YX3A('89)	1,004,060	305
7.0	LU1IV('97)	7,671,456	702
14	YW1A('91)	4,617,456	732
21	ZP5XF('97)	5,023,872	712
28	CE3DNP('89)	2,857,038	582
AB	P4ØW('94)	14,168,115	845

MULTI-OP SINGLE TRANSMITTER

AF	CQ3X('95)	13,254,620	790
AS	H22A('97)	13,234,556	842
EU	R6L('93)	9,194,688	939
NA	KP2A('89)	12,843,135	835
OC	AG9A/AH2('91)	9,005,641	787
SA	8R30K('96)	12,302,226	837

MULTI-OP MULTI-TRANSMITTER

AF	6V6U('97)	9,938,896	758
AS	JE2YRD('91)	8,388,942	866
EU	9A1A('97)	17,925,084	1076
NA	WL7E('97)	13,001,280	928
OC	KH7R('97)	11,760,354	822
SA	LQ5A('89)	8,290,016	784

QRPp

AF	5Y4FO('92)	649,057	311
AS	4X4UH('82)	1,028,904	344
EU	LZ2BE('91)	1,137,488	506
NA	VP2MU('91)	1,554,735	469
OC	FO8JP('86)	572,131	259
SA	P40W('97)	4,018,208	632

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AL-811
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Suggested Retail

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A *quiet*, powerful computer grade blower draws in plenty of cool air. It *pressurizes* the cabinet and efficiently cools your 811A tubes. Our air flow is so quiet, you'll hardly know it's there -- unlike noisy, poorly chosen blowers.

You also get efficient full size heavy duty tank coils, full height computer grade capacitors, heavy duty high silicon core power transformer, slug tuned input coils, operate/standby switch, transmit LED, ALC, dual meters, QSK compatibility with QSK-5 plus much more.

AL-811 has three 811A tubes and gives 600 Watts output for only $649.

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AL-80B
$1249
Suggested Retail

Full kilowatt PEP output from a whisper quiet compact desktop linear Only 8½x14x15½ inches. Plugs into nearest 120 VAC outlet. All bands 160-15 Meters, 1000 watts out on SSB, 850 watts out on CW, genuine Amperex 3-500ZG tube has graphie plate, nearly 70% efficiency, inrush current protection, multi-voltage tranformer.

NearLegalLimit™ Amp

AL-572
$1395
Suggested Retail

New class of *Near Legal Limit™* amplifier gives you 1300 Watt PEP SSB power output for *65%* of price of full legal limit amps! Four rugged *Svetlana* Russian 572B tubes. Instant 3-second warm-up. Plugs into 120 VAC. Compact 8½Hx15½Dx14½W. 160-15 Meters. 1000 Watt CW output. Tuned input, instantaneous RF Bias, dynamic ALC, parasitic killer, inrush protection, two lighted Cross-Needle meters, multi-voltage transformer.

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AMERITRON's* legal limit *amplifiers use Peter Dahl super heavy duty Hypersil® power transformer capable of 2500 watts!

Ameritron's most powerful Amplifier

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Suggested Retail

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Ameritron's toughest legal limit Amp

AL-1200 *with Eimac® 3CX1200A7 tube*

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Suggested Retail

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Suggested Retail

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Two tubes
1500 Watts plus

Suggested Retail
Call your dealer for your best price!

AL-800
$1595
Single tube
1250 Watts

AMERITRON's new AL-800/H amps cover 160-15 Meters including WARC bands. The AL-800 has a single Eimac™ 3CX800A7 tube and produces 1250 Watts PEP. The AL-800H has two 3CX800A7s giving 1500 Watts *plus*.

Both amps have an adjustable slug tuned input circuit, grid protection, ALC control that is front panel adjustable,vernier reduction drives, heavy duty 32 pound grain oriented silicone steel core transformers and high capacitance computer grade filter capacitors.

These amplifiers have multi-voltage operation (14 user selectable AC line voltage from 90-140; 200-250 VAC), quiet pressurized ventilation systems, dual illuminated Cross-Needle meters that read peak forward and reflected power, SWR, high voltage, grid current and plate current.

Vernier reduction drives make tuning adjustments smooth and easy. Ameritron's exclusive *Step-Start Inrush Protection™* stops damage to your amplifier from inrush current. Ameritron amps feature an attractive Lexan front panel decal and superior, all metal construction -- it's built to last! Ultra compact desktop size is perfect for your operating station. 8½x16½x14¼".

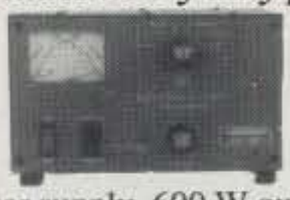
AMERITRON no tune Solid State Amplifiers

Ameritron ALS-500M Mobile no tune Solid State Amp has 500W out, covers 1.5-22 MHz

ALS-500M
$799
Suggested Retail

Ideal Mobile amplifier -- uses 13.8 Vdc mobile electrical system, very compact 3½x9x15 in., extremely quiet, 500W output, 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm up, no tubes, SWR protected.

Ameritron ALS-600 no tune Solid State FET amp includes heavy duty power supply, 600 Watts out



ALS-600
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Suggested Retail

No tuning, no fuss, no worries -- just turn it on and operate. *Includes* AC power supply, 600 W output, continuous 1.5-22 MHz coverage, instant bandswitching, *fully* SWR protected, extremely quiet, very compact. Amp is 6x9½x12 inches.

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CIRCLE 115 ON READER SERVICE CARD

BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

Keys, Keys, and More Keys!—Part II

We are back with Part II of this year's keys special, and friends, it is blowing apart with telegraphic treats! We had to adopt a "more views and less details" format to squeeze in all the terrific little heartthrobs. There is something for everyone in this month's collection: miniatures, spark keys, breathtaking bugs, paddles, and homebrews. Stick with us, and you too soon will be enjoying new found pleasures on CW.

A number of readers have asked my opinion about starting key collections—what type of keys are preferred, what should they cost, etc. There are no set answers! Some folks collect only hand-keys, some specialize in bugs, and some prefer paddles they can purchase new and use with modern keyer-equipped transceivers. Some specialize in an era such as spark or a brand such as Vibroplex, McElroy, or Speed-X. It is a matter of personal interest and attraction. The only guideline on pricing is what you feel comfortable paying and the seller feels comfortable accepting. Both parties usually can sense when prices are being "gouged."

Have you considered collecting miniatures? They are small, low cost, require minimum display space, and are tremendous fun to use—especially when traveling with a pocket-size QRP rig. Want a quick start in the game? Three are featured this month, two more are available from NE8KE and G4ZPY (addresses in last month's column), and more are featured in my *KEYS II* book (available direct from my QTH to yours for $15 plus $2 postage). That tallies to seven or eight miniatures right now. Furthermore, discount coupons for several hot miniatures are included in my new self-published *QRP NOW!* book. Using the coupons equates to getting the book (also $15 plus $2 book mail rate or $3 priority mail) free.

Let's jump into some exciting key views!

Marvelous Miniatures

If you or your friends delve into QRP, you probably have heard of the "Little Red Key" shown in photo 1. Folks team it with all kinds of mini-rigs for traveling and operating portable, and it is a stout-hearted little pumper. The key is made by Gil Kost, W3MKE, and he calls it "the little key with the big personality." Why? In addition to regular gap and tension adjustments, Gil integrates a slightly different degree of arm looseness or tightness into each key during production. He then carries a variety of similar-looking yet different-feeling keys to hamfests so folks can try them and pick one best suited to their fist. Are key sales thus limited to hamfests? Not necessarily. Folks usually can describe a preferred "feel" by telephone. Alternately, you could take "pot luck" and probably emerge fine. The little Red Key measures 1 by 1.5 inches and has a full-size knob, rear binding posts, and some moldable adhesive on the bottom to hold it firmly on a desk, rig, etc. Want one? Write or ring up Gil at The American Radio QRP Key Mfg. Co., 3710 Buckingham Road, Baltimore, MD 21207-3813 (410-484-7951). While on the line, ask Gil about his little red single-lever paddles, too. I hear they are neat.

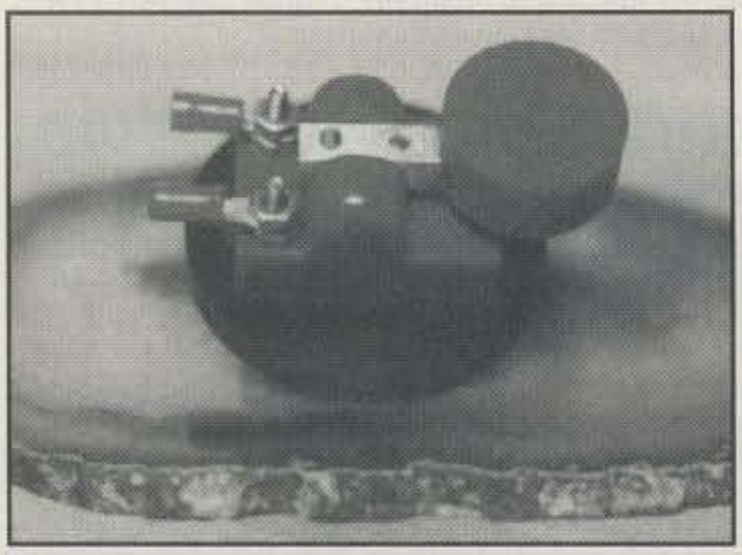


Photo 1– Red, hot, and pumping! These "Little Red Keys" measure 1 by 1.5 inches and are made by The American Radio QRP Key Mfg. Co. They often are sold at east coast hamfests, where operators can hand pick one best suited to their fist. The tiny key is quite rugged and works well with pocket-size rigs. (Photo courtesy Gil Kost, W3MKE)

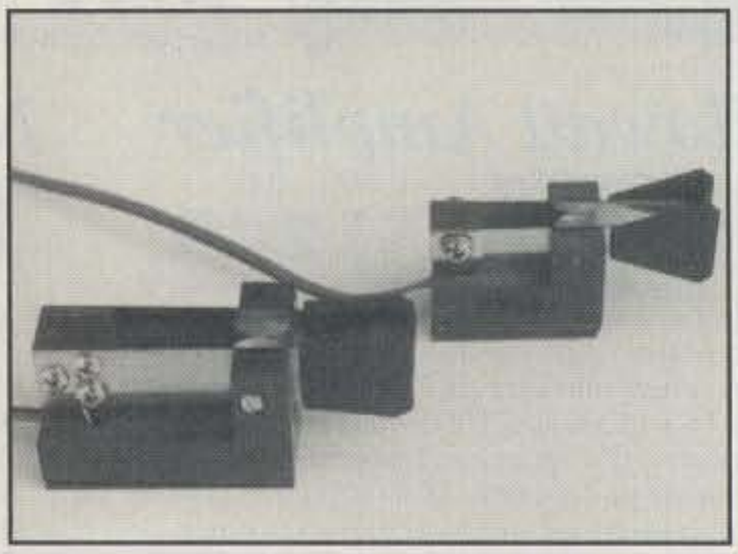


Photo 3– Making its debut beside "big brother" is the new tee-tiny "BP" model Paddlette made by Bob Hammond, KI7VY/Paddlette Co. The standard Paddlette measures 2.5 inches tip-to-tip, and "BP" is 2 inches end-to-end. Both versions are supplied with adhesive-backed magnetic plates for solid footing on various surfaces, and both versions handle very well.

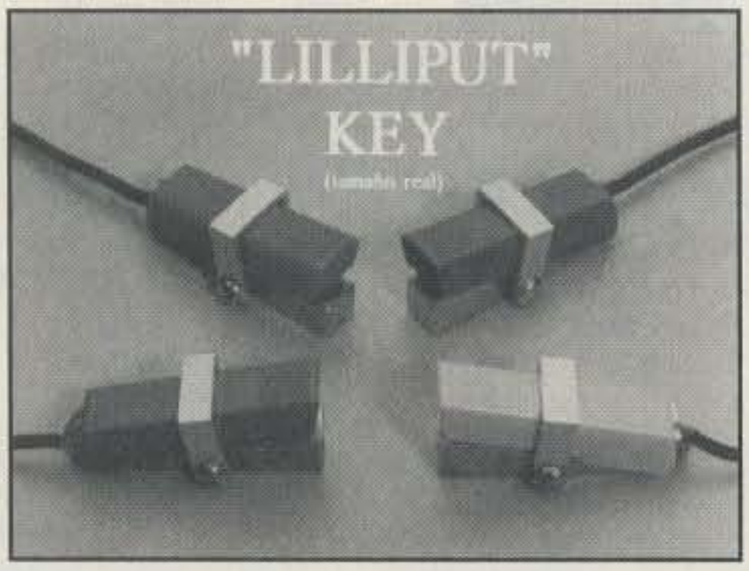


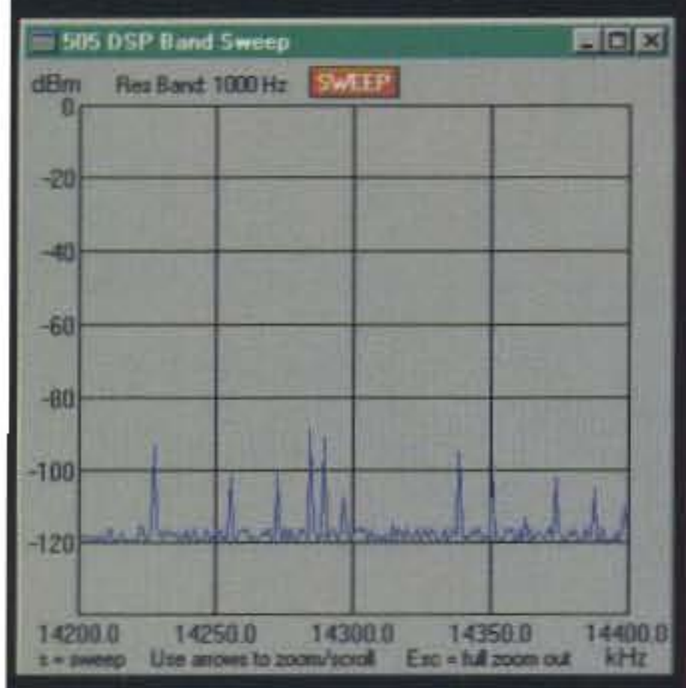
Photo 2– Jero, EA3DOS, of Barcelona, Spain converts miniature staplers into hand keys called "Lilliputs." They are merry little manipulators with a good feel. The key is only 2 by .5 inch in size and also are available red, green, blue, and yellow. (Photo courtesy EA3DOS)

Our next miniature is a home—err, adapted—little tyke from Jero, EA3DOS, in Barcelona, Spain. It is called the "Lilliput" (photo 2). Jero makes these keys from miniature staplers, modified with a repositioned cover, a wide rear contact, and a top strap that can be swivel-adjusted to vary the gap from wide to almost closed. During use, the Lilliput's contacts produce a defined "click," and the cover returning against its top strap make an accompanying "clack" that sounds quite similar to a classic J-38. Just dinking with the little key is fun! It's another "stick it in your pocket" manipulator for outdoor QRP, plus it is available in red, blue, green, or yellow. Due to the metal surface below its knob, the Lilliput is particularly good for handheld operation. Jero originally made the keys for prizes in European contests, but folks like them and convinced him to make more, so he did. You can order one by writing to Jero, EA3DOS, Hispania CW Club, Av, Roma, 10, 08015 Barcelona, Spain.

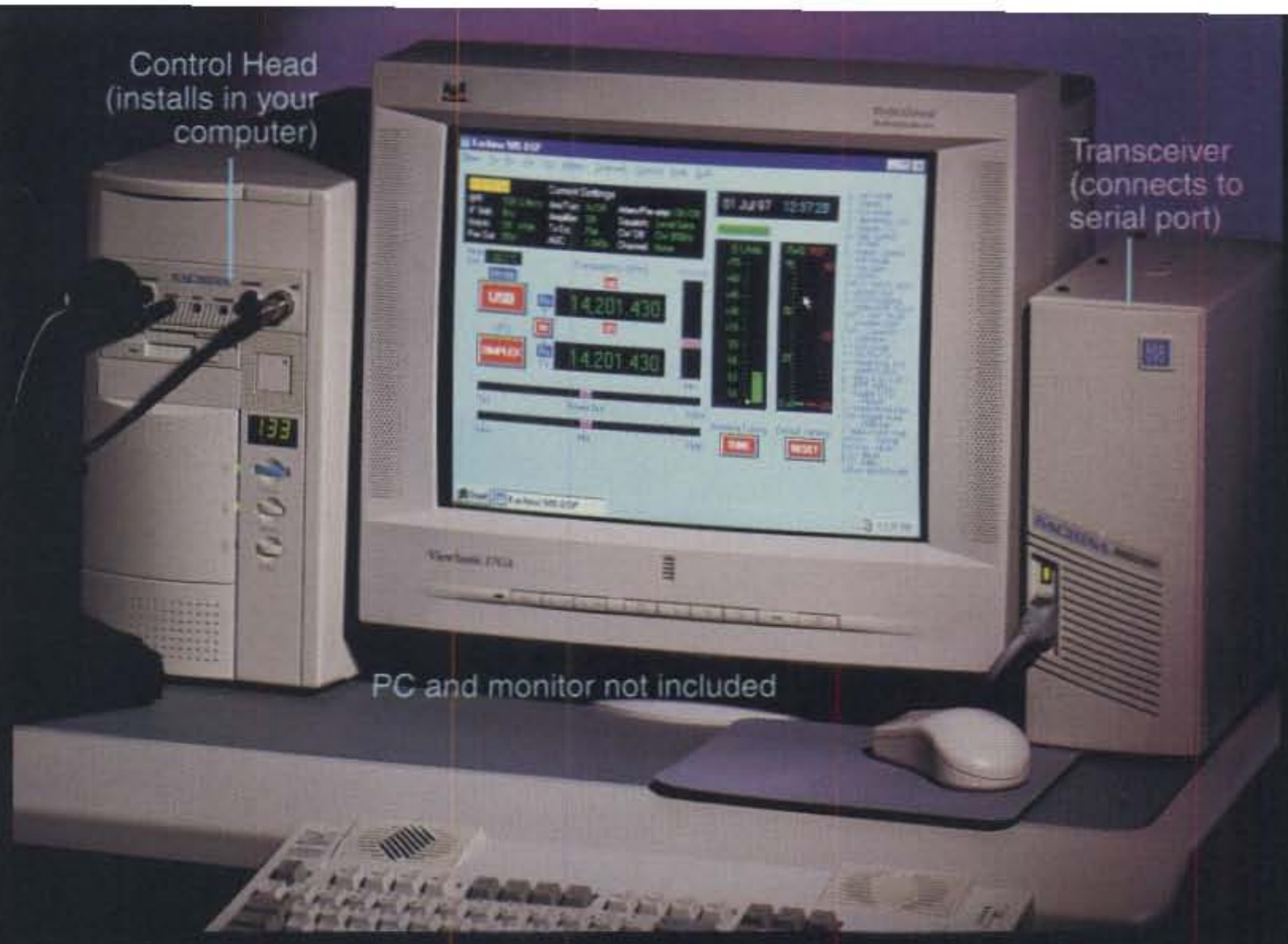
Remember the little palm-size Paddlette first introduced in our fall '97 QRP

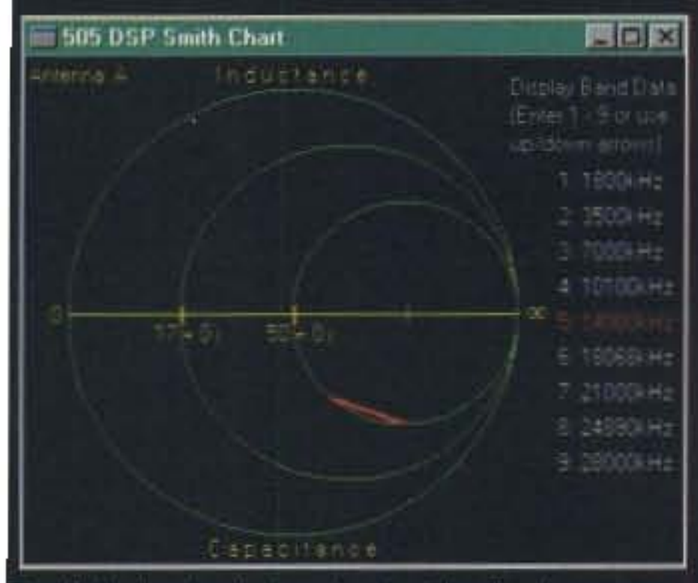
4941 Scenic View Dr., Birmingham, AL 35210

Say You Saw It In CQ



Band Sweep" window allows you to look for the pile-ups. "Point and click" the mouse to instantly change frequency and join in.





Smith" chart window instantly displays your antenna Z for the entire band.

Built-in logging software lets you keep track of your QSOs.

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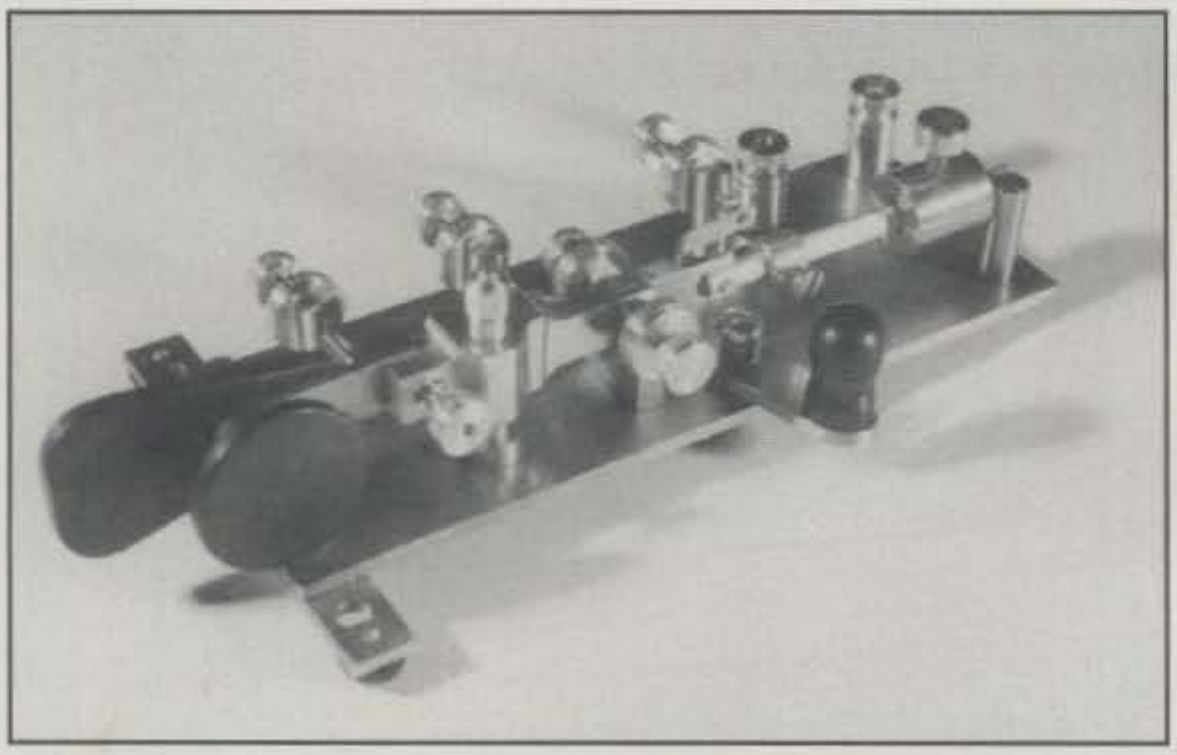

Photo 4– This perfectly scaled replica of a rare Vibroplex Midget was made by John Bipes, KØYQX, over the '97 Christmas holidays. The key is an absolute show-stopper! John presently enjoys using it on the air—the ultimate reward.

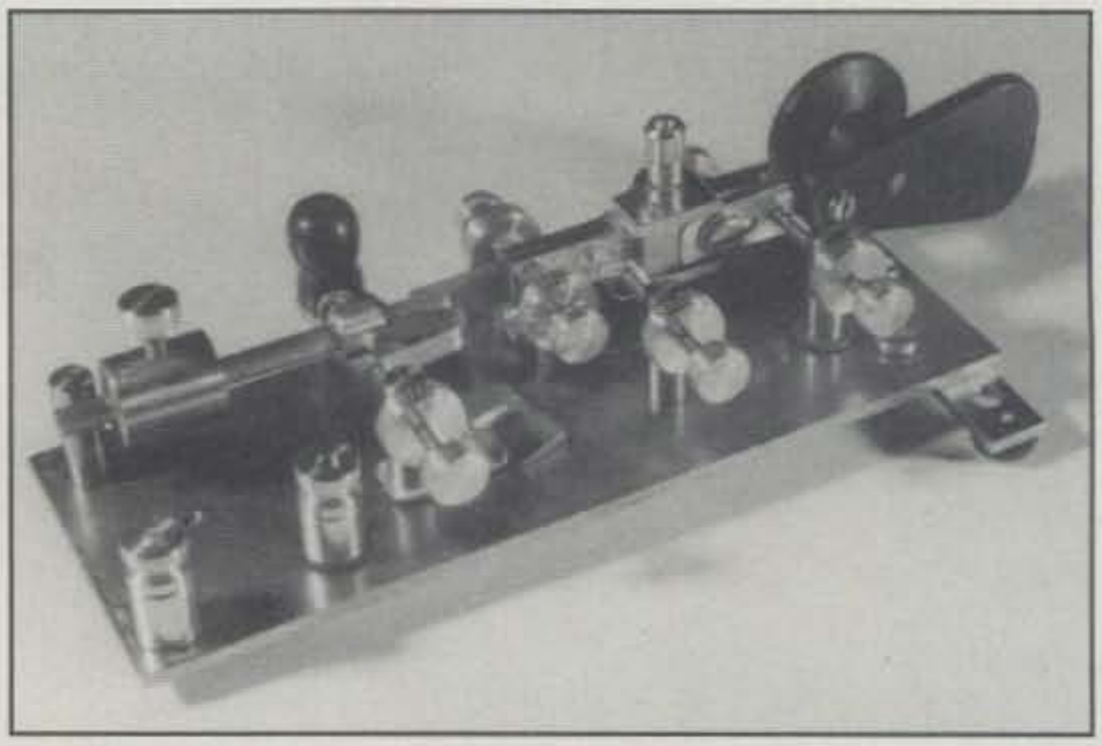

Photo 5– Opposite side view of the KØYQX replica Vibroplex Midget. With only a couple of authentic Midgets known to be left in existence, John has a real prize.

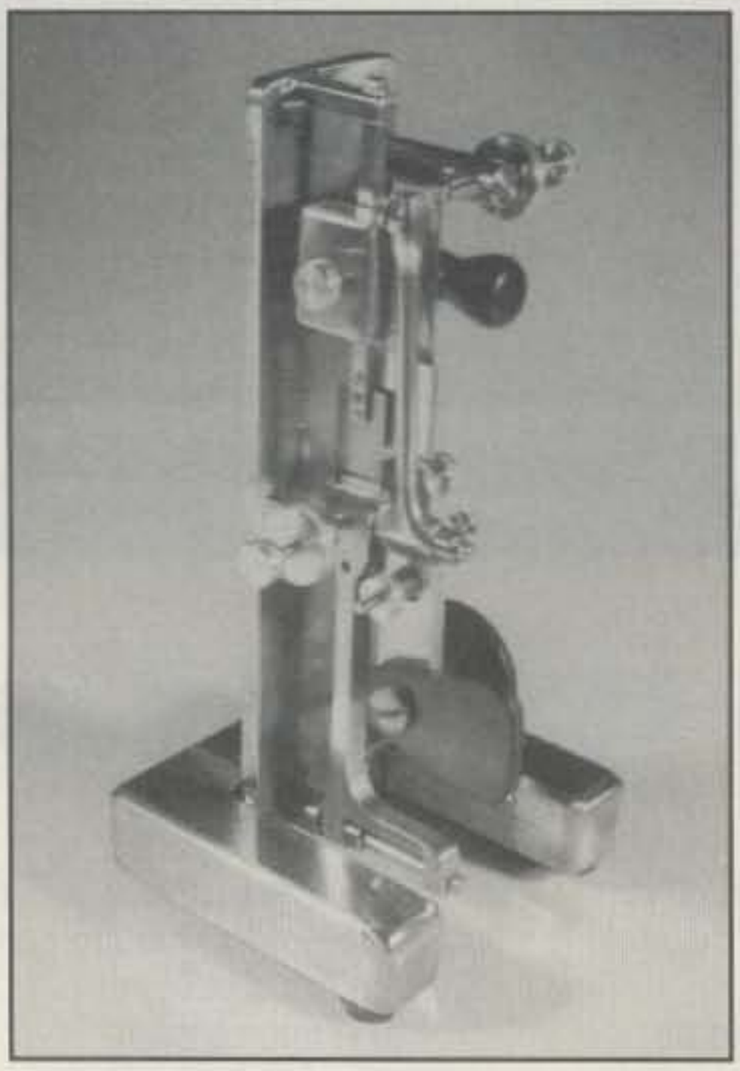

Photo 6– Encore! This replica of a highly sought Martin Upright or Vertical Vibroplex bug made by KØYQX looks even better than an original! Since John actually uses the vertical on the air, it may even handle better than an original. This is because the key has a single set of contacts for dots and dashes like the Model "X." (Photo courtesy John, KØYQX)

column? It now has a subminiature brother complete with scaled-down knee mount and carry case for ultra-light portable operations, and it is a gem. The new "BP," or backpacker, version Paddlette is shown along with its full-size counterpart in photo 3. Both Paddlettes sport a dual cantilever-type design. That is, their arms are spring brass and swing from the rear and mate with a common center post. Fine-pitch screws recessed on each side set gaps on each lever, and a tiny adjustment wrench stores in a hidden slot on the base. Speaking of which, the full-size Paddlette's base is 1.75 by 1 inch, and the "BP's" base is 1.25 by .75 inch. The base on both versions is fitted with a magnetic plate that mates with another adhesive-backed magnetic plate for the knee mount, a desk, rig, etc. Two extra magnetic plates are supplied (and more are readily available) and make moving the paddle from one spot to another a cinch. The "BP"'s leg mount is really clever: It has a small metal bracket for the paddle, an adjustable buckle, and a one-touch quick-release clip. Once adjusted to fit, you can snap it on/off in a second. Want more details? Write or ring up Bob Hammond, KI7VY, of Paddlette Company, P. O. Box 6036, Edmonds, WA 98026 (425-743-1429).

Spectacular Semis

A couple of years ago in this column I suggested that those with aspirations of owning and using a rare and impossible-to-find bug might consider making their own copy of that "dream key" at home. John Bipes, KØYQX, accepted the challenge and produced the terrific replica of a Vibroplex Midget shown in photos 4 and 5. Full details on how John made the masterpiece are too extensive for our brief column, so I will "hit the high points."

First John extrapolated dimensions from photos and drawings in my *KEYS II* book and Holly's *Vibroplex* book and drew up exact-size blueprints of the Midget. The base, main arm, pendulum, weight, and upright posts were then made from pieces of hot-rolled steel and polished to perfection (with enough rejects to make another Midget hitting the trash bin along the way). The dash lever contactor was cut from brass. A scavenger hunt and improvising session followed. A steel bandsaw blade was milled to produce a mainspring, and a razor blade was cut and formed into a "U" plus fitted with welding rod tips to make a dot contactor spring. Thumbnuts fitted with more welding rod tips for contacts and readily available (really?) single-wheel "knurlizers" for locknuts became contact and arm travel adjustment screws. Pieces of a genuine phenolic box and drawer pull were styled into authentic-era fingerpieces. John really "did things right!"

After completion, John's main concerns centered around whether or not the Midget would handle comfortably enough to use daily on the air, and whether it should be nickel plated or painted. With only a couple of Midgets known to be in existence, such apprehensions make good sense! To John's delight, the little bug performed perfectly! He still has not decided on plating.

Leftover pieces of steel and brass again piqued John's urge to replicate just one more special bug: Martin's famed Upright, or the Vertical Vibroplex shown in photo 6. Once again, full-size blueprints were drawn up, and once again machines in John's workshop whirred. (Oh, if we had only been there to catch "reject parts"!). A few compromises were necessary to ensure the bug's Model X-type mechanism worked smoothly, but the finished product turned out great. Yes, John is using the Midget and Vertical today, and no, he cannot be coaxed away from the rig to make more replicas (sigh!). The boy is hooked for life! Congratulations, John, and thanks for sharing views of your creations with us!

Few details on the exotic rarities shown in photos 7, 8, and 9 are presently available, but we simply could not resist sharing first-ever views of these incredible bugs. First is the Hunter Apex bug made by VP1AA in 1963. Notice its low-slung

Say You Saw It In CQ

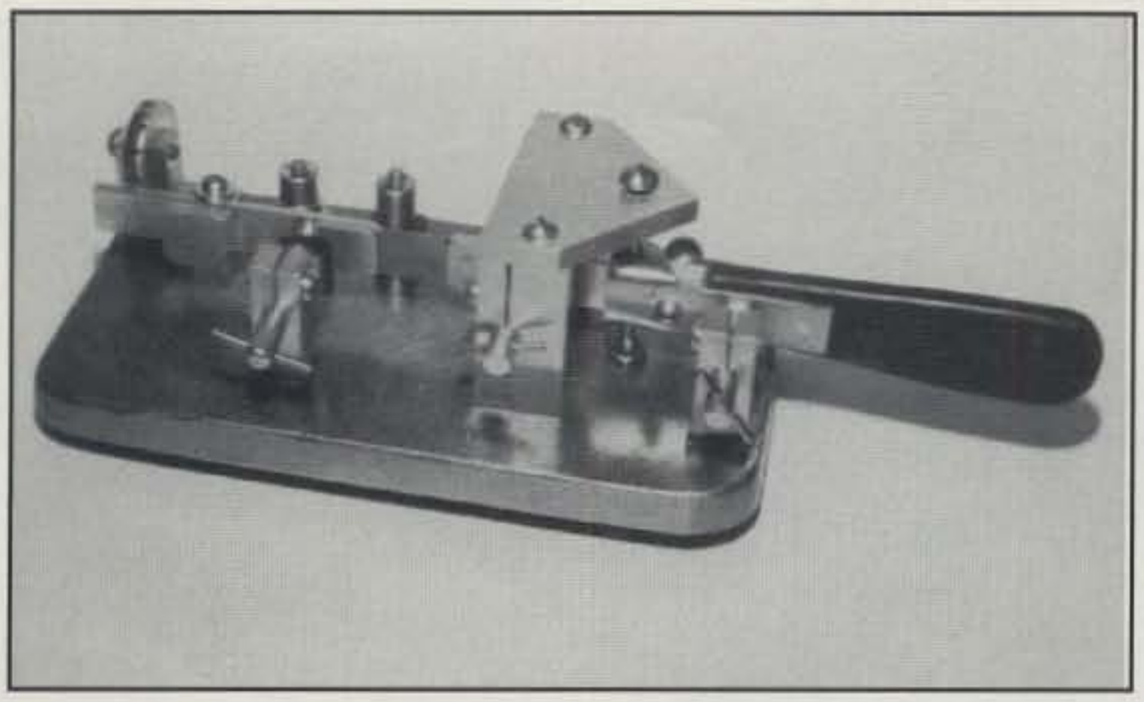

Photo 7– The unique Hunter Apex bug made by VP1AA in 1963. The general design is similar to a Vibroplex "Lightning Bug" except tee-handle rods with set screws are used for adjustments. Very few of these gems are known to be in existence. (Photo courtesy Gil, K9WDY)

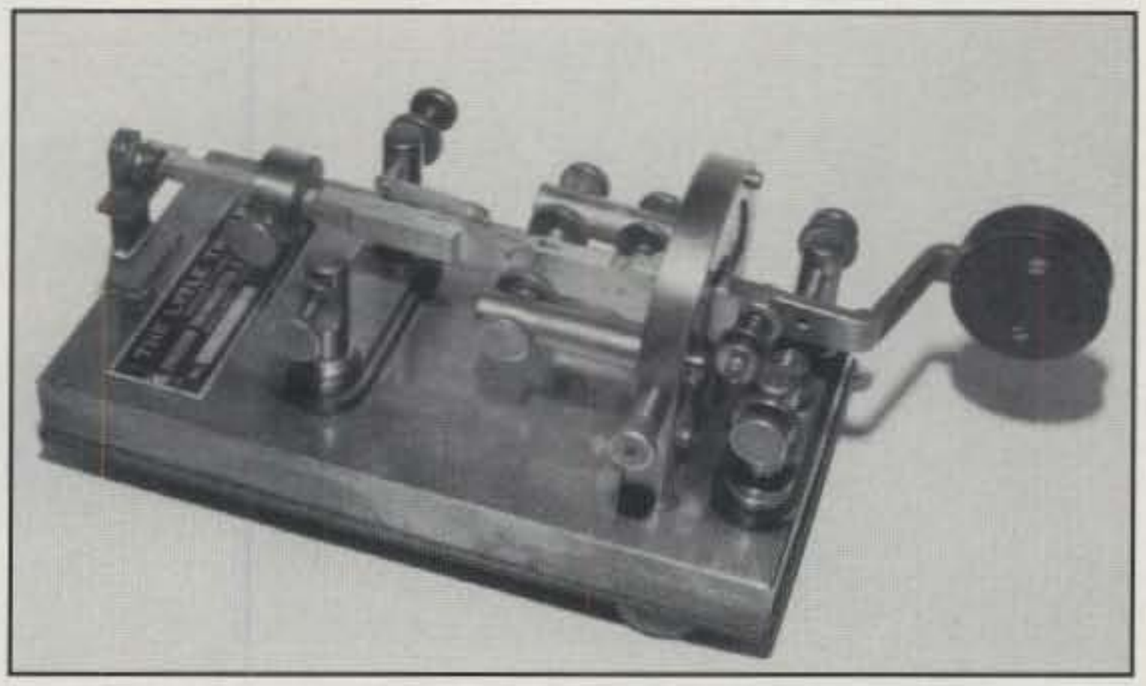

Photo 8– Absolutely awesome best describes the rare Lytle "Triplex" bug made by the Precision Thermometer and Instrument Co. in 1921. The key sports a rotatable yoke with dot/dash contacts on both sides for left- and right-hand operation, plus a center contact for use as a pump key. (Photo courtesy Gil, K9WDY)

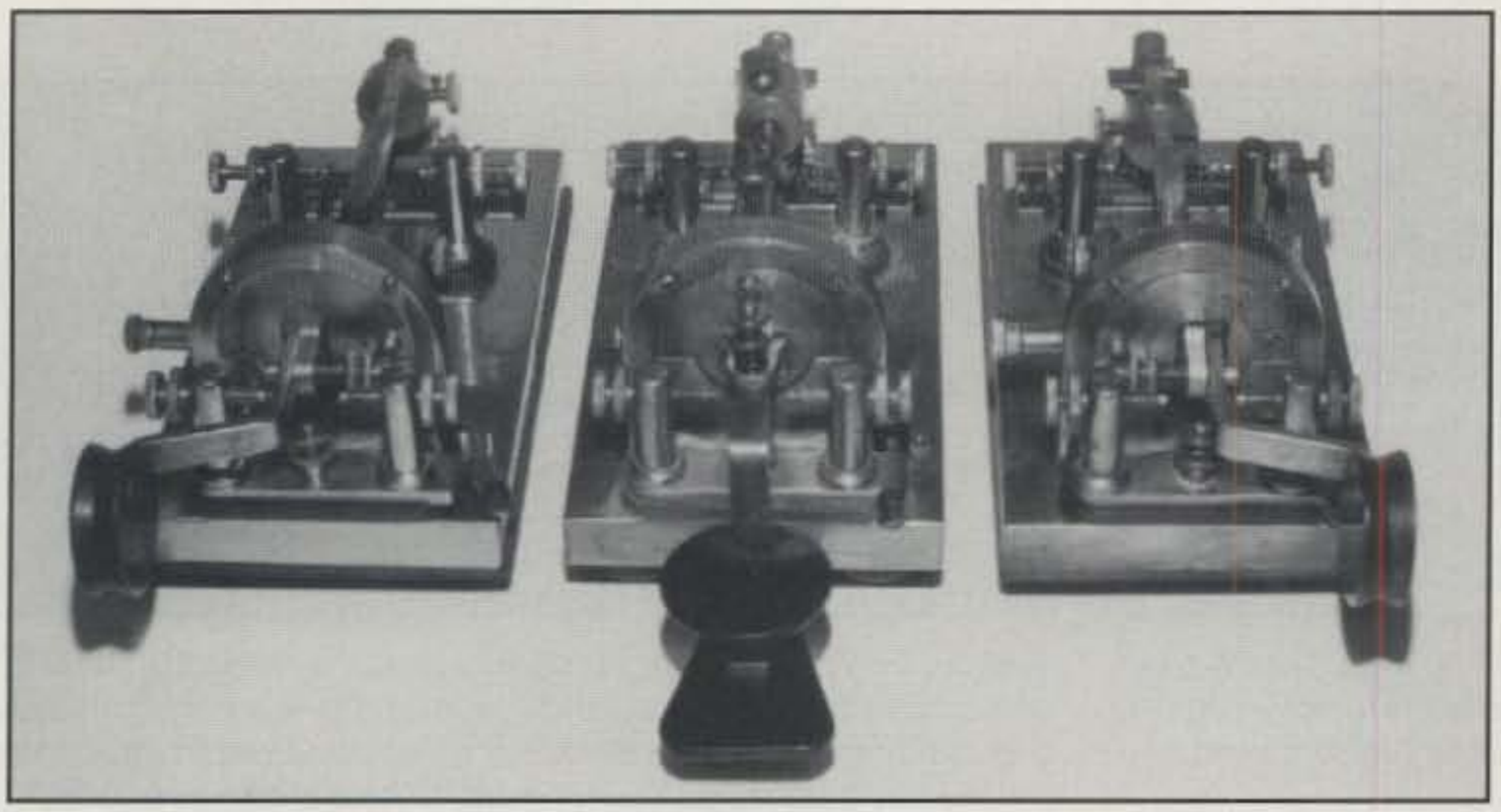

Photo 9– The world's only "Triplex triplets"! This is not trick photography, gang. It's real! Close examination reveals different amounts of wear on adjustment screws. It's like seeing three 1954 Corvettes in one place at the same time—a one-in-a-million view! (Photo courtesy Gil, K9WDY)

design, flat-top yoke assembled with screws "Lightning Bug style," and streamlined fingerpiece. It's a fast-looking critter, isn't it? Particularly interesting are the tee-handle rods locked with set screws for dot, dash, and arm travel adjustments (the latter on left yoke support). Scribed lines (cuts?) are barely noticeable on the base. Whether indicative of poor machining or purposely included as a "signature" is unknown. It's truly a great bug we would be delighted to use today! This key presently resides in the proud collection of Gil Schlehman, K9WDY. Thanks, Gil!

Our spotlight now falls on a real big-time telegrapher's key: the Lytle "Triplex" shown in photos 8 and 9. This super semi was manufactured by the Precision Thermometer and Instrument Co. of Philadelphia, California in 1921, and is probably the only rival to a rotary yoke Dow ever made. It has dot and dash contacts on both sides, plus a third contact for hand/pump operation in front of the yoke and below the main arm. By loosening a thumbnut on the yoke's left side, the main/center mechanism can be rotated for left- or right-hand operation, or positioned vertically for use as a "pumper." Most curious is the arm's offset, which presents a rather precarious position for an operator's fist. No doubt about it: This would be a dandy bug to mate today with a classic rig such as a DX-100 and NC-300! Not one, not two, but three (!) Triplex bugs reside in the remarkable collection of K9WDY. Thanks, Gil.

Phenomenal Pumpers

Classic spark keys are always fascinating to study, as they are tangible pieces of our proud heritage. The Marconi "rock crusher" key shown in photo 10 really demands respectful attention. Check out the finned heat sink 50 amp contacts, gang! Obviously it was made for use with colossal spark rigs that flamed with high voltage, filled the air with the smell of ozone, and caused an operator's hair to stand on end. Thanks to K9WDY for sharing this view.

Yet another "far out" Marconi spark key from K9WDY's collection is shown in photo 11, and this one pours on the glitz. The key sports contacts for both "make"

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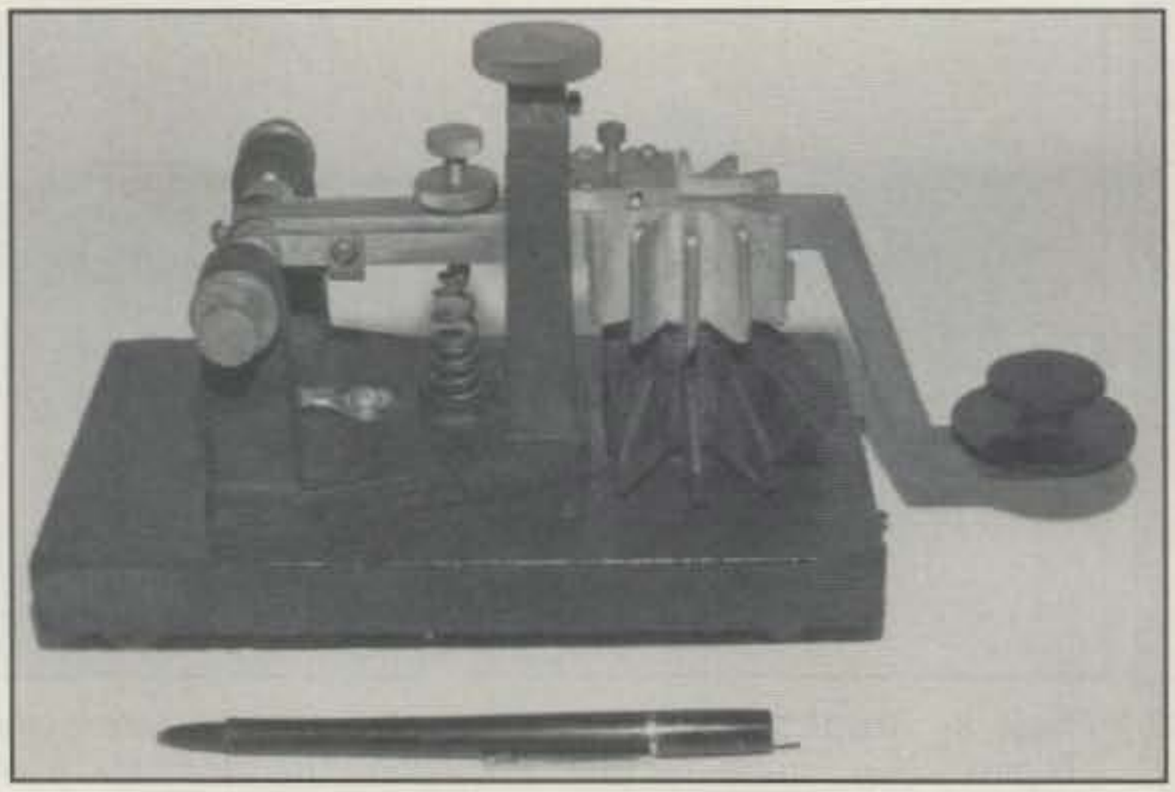

Photo 10– Now this is what you need for keying those open-air 4-1000 TNT transmitters, gang: a genuine Marconi "rock crusher" key with 50 amp contacts and finned heatsink for cool operation. Ka-lick for sure! (Photo courtesy Gil, K9WDY)

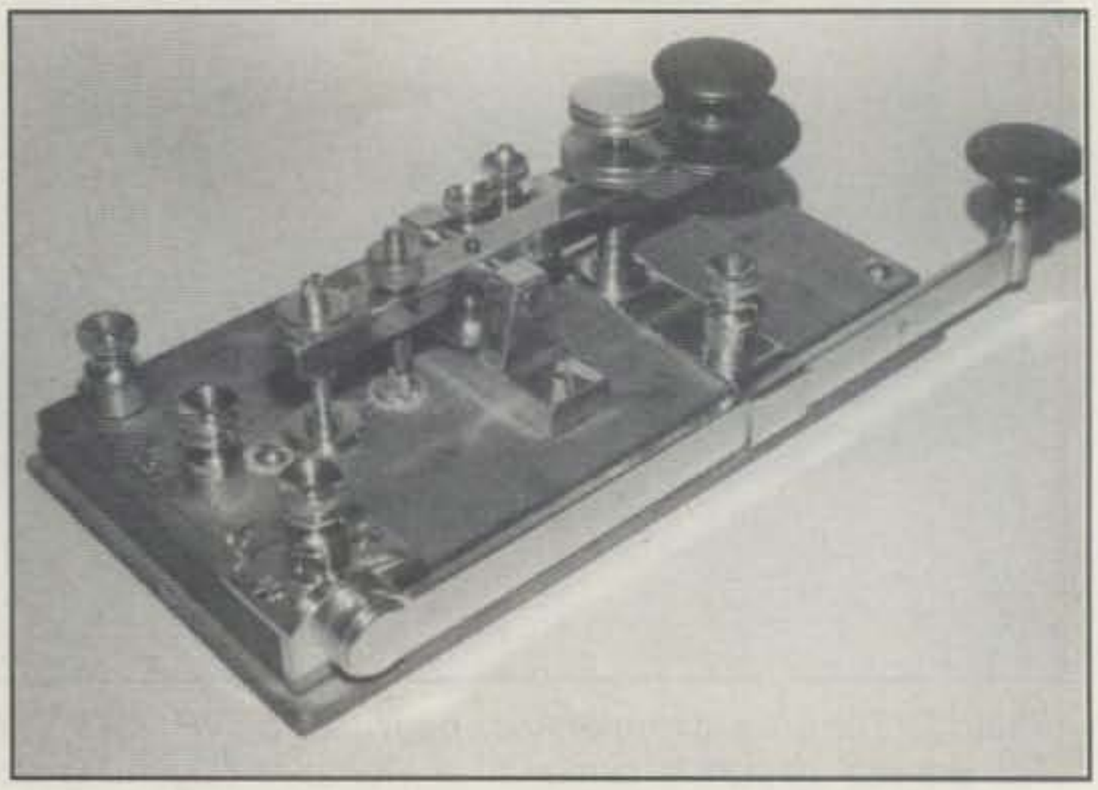

Photo 11– A "big rig" key with QRP on the side! This Marconi spark key sports contacts for both "make" and "break" plus an auxiliary-circuit key and is in immaculate condition for its age. (Photo courtesy Gil, K9WDY)

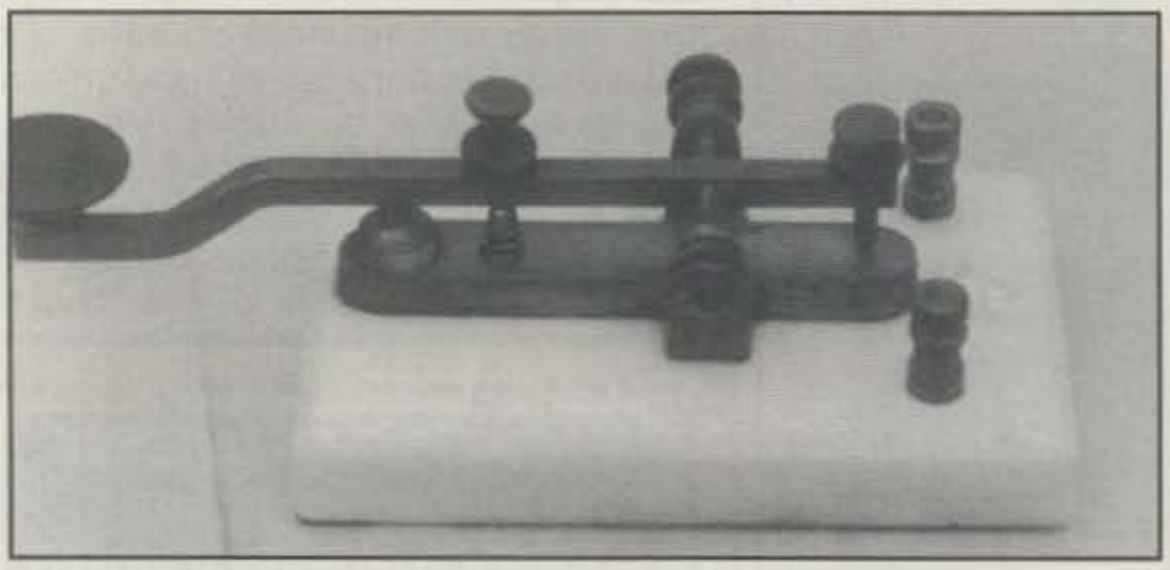

Photo 12– This Boston-style key was made by Kilbourne & Clark in the 1930s and was used on various expeditions to polar regions. As such, it was dubbed "the key they took to the Antarctic."

Photo 13– This elegant pump key made by Hugo, LU2MDE, combines bronze, wood, and tungsten (for contacts) in ideal proportions. All the fine details are not apparent in the photo, but the key's appearance is superb! (Photo courtesy LU2MDE)

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and "break," and the design of its fulcrum and "pull down" tensioning spring reflect traditional British influence. I am not sure about the arm and knob on the key's left side, but it apparently was used to activate an opposite polarity circuit or a lower power/secondary transmitter. The overall workmanship and condition of this prized vintage gem is exquisite.

Bob Niemeyer, K6RML, passed along a picture of his special pride shown in photo 12. It was made by Kilbourne & Clark of Seattle, Washington during the 1930s. Used with communications gear carried on polar explorations, it was dubbed "the key they took to the Antarctic." The key's basic design (long arm, large contacts, and marble base) is quite similar to the famous "Boston Key" of spark-era popularity. Truly, both are a collector's pride.

Handsome Homebrews

Space is running tight, so we'll step up the pace. First in this next group of heartthrobs is the smart-looking pump key (aka "manipulator") made by Hugo A. Dichiara,

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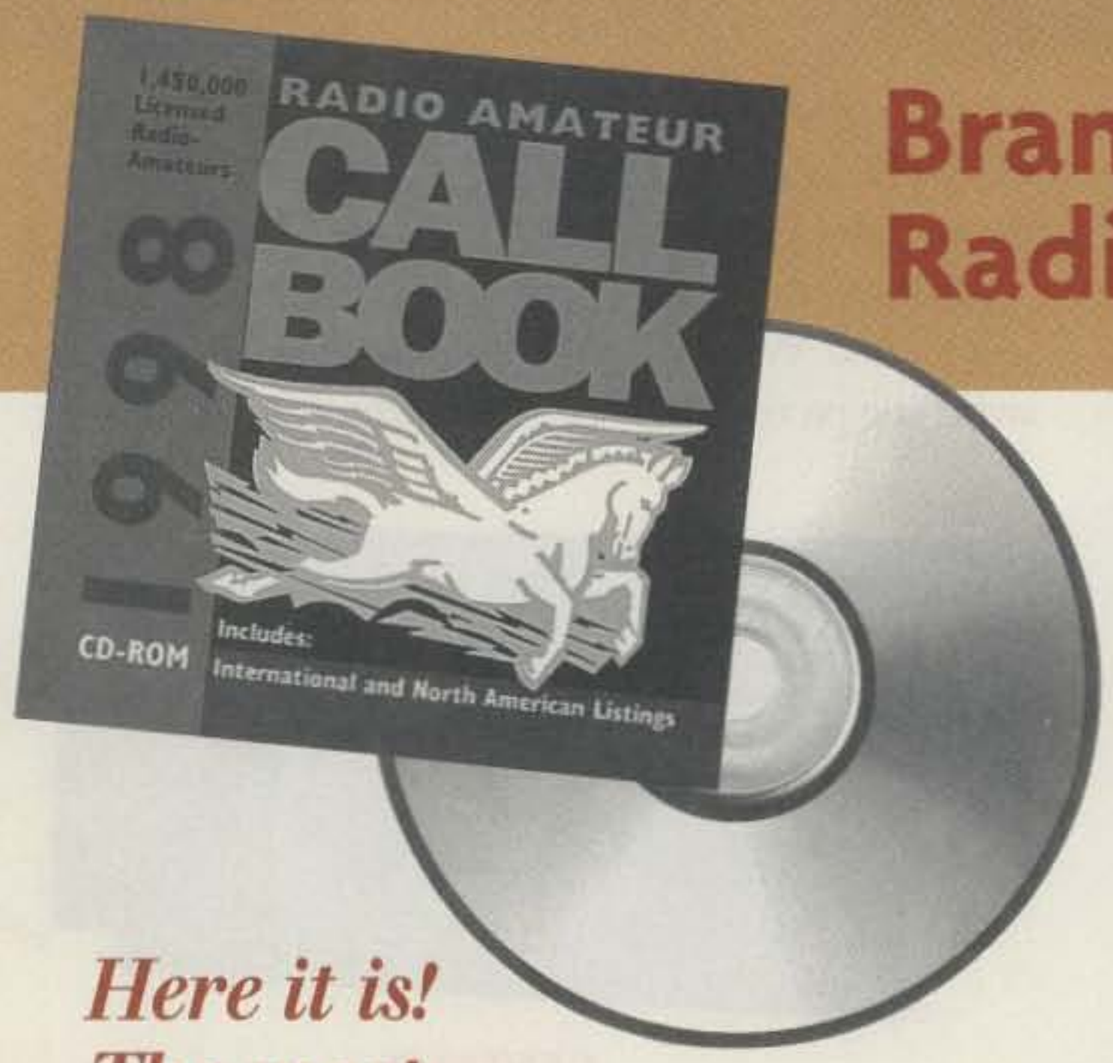

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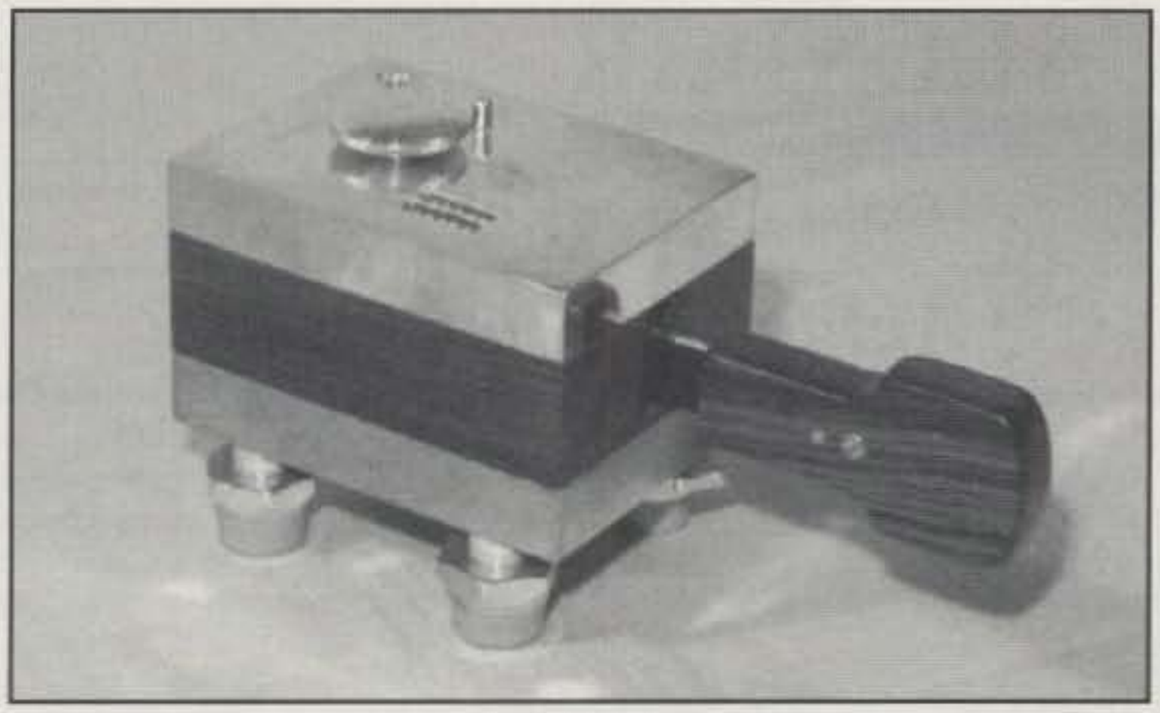

Photo 14– Dave Hembling, VE7DKR, combined a homebrew mechanism with a surface-mount Tick keyer to produce this sharp self-contained unit. The single pushbutton on top accesses all functions. A lithium cell provides power. (Photo courtesy VE7DKR)

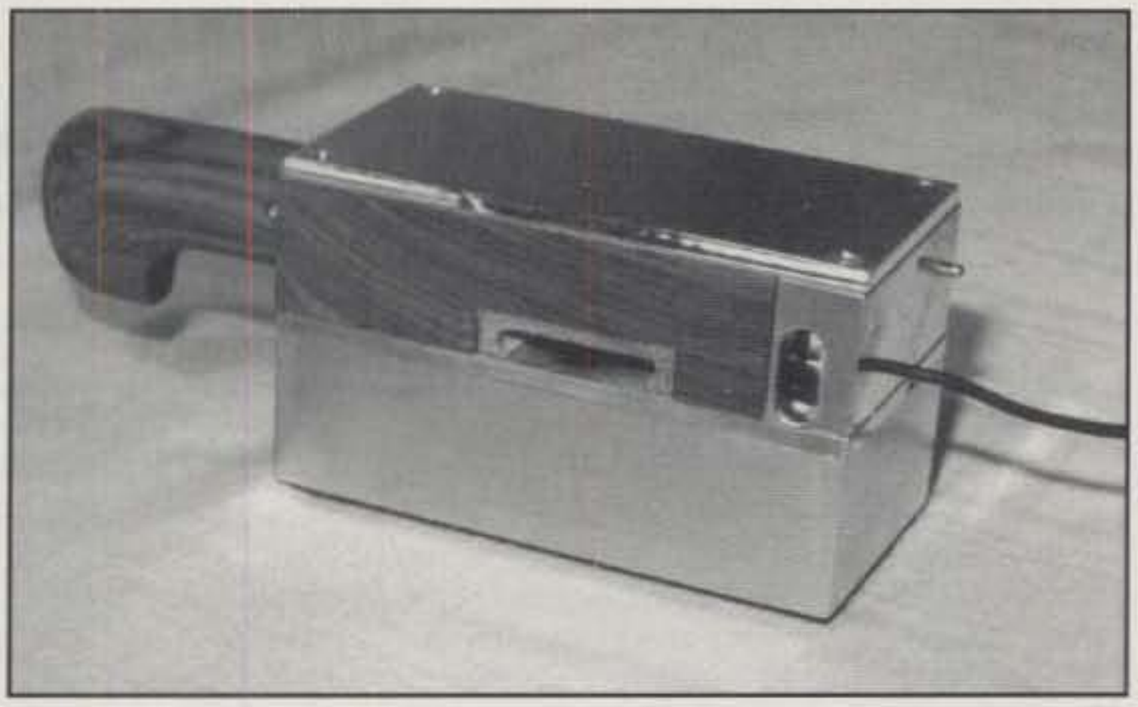

Photo 15– This second-generation keyer made by VE7DKR is remarkably small and good looking. A coin cell for power slides into the slot on the side. (Photo courtesy VE7DKR)

LU2MDE, and shown in photo 13. Hugo made this gem from bronze and madera wood in his home workshop. If it handles half as well as it works, he has a winner!

Dave Hembling, VE7DKR, elected to pursue an "all in one" route by homebrewing the ultra-compact paddle and keyer units shown in photos 14 and 15. The mechanism in each is cut and milled PC board material with close-spaced contacts for a light touch. Each unit is also fitted with cocobolo wood fingerpieces and tiny Tick keyers. A small lithium cell inserted in a side slot provides power. Nice!

Wrap Up

That winds down the views for this time. However, with your continued sharing of photos and key information, more columns spotlighting terrific tappers will be coming in the future. Already some pictures of exotic keys have arrived, and they are unbelievable! Keep those photos coming, gang!

More exciting columns on mobiling, classic rigs, and QRP will be forthcoming, too. Stay tuned!

As this column is being written (mid-February), my new book *QRP NOW!* is moving toward completion, and it's terrific! Folks are already "on the list" to get first copies, autographed in appreciation for waiting (printed copies should be available in late April 1998).

73, Dave, K4TWJ

CIRCLE 140 ON READER SERVICE CARD

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Monthly Contesting Tips—A CQ Anthology, Conclusion

6th Annual Dayton Contest Banquet

The sixth annual Contest Banquet at the Dayton Hamvention will be on Saturday night, May 16th, at the Crown Plaza Hotel (formerly Stouffers), Fifth & Jefferson Streets, in Dayton. Included during the dinner will be CQ Contest Hall of Fame presentations, prizes, and a program. Cost for the tickets is $28.00 per person. Seating is limited to 300. To order your tickets with a credit card, call (from 1500–2300Z) in the U.S. 1-800-457-7373 or outside the U.S. 603-899-6957, e-mail <nx1g@top.monad.net>. The cutoff date to order tickets is May 7th.

Calendar of Events

Apr.	25-26	Florida QSO Party
Apr.	25-26	Nebraska QSO Party
Apr.	25-26	Helvetia Contest
Apr.	25-26	Ontario QSO Party
May	2-3	ARI Int'l DX Contest
May	2-3	Massachusetts QSO Party
May	2-3	Connecticut QSO Party
May	2-3	MARAC County Hunters CW Contest
May	9-10	CQ-M Int'l DX Contest
May	9-10	Nevada QSO Party
May	9-10	Georgia QSO Party
May	9-10	Indiana QSO Party
May	16-17	Baltic Contest
May	23-24	Texas QSO Party
May	30-31	CQ WW WPX CW Contest
June	13-15	ARRL June VHF QSO Party
June	20-21	All Asia DX CW Contest
June	27-28	ARRL Field Day
July	1	RAC Canada Day Contest
July	11-12	IARU HF Championship
July	25-26	IOTA Contest

Last month we began our compilation of "Contest Tips" with November 1992, our first one. This month we conclude the list, finishing up with the end of last year. As we continue the series in 1998, feel free to e-mail your thoughts to me for a future monthly edition. And now, on to the list of "Contest Tips."

1994

January: Do you recall the painful experience of having a beautiful QSO run disappear almost instantly? Many times it's nothing more than the band changing. However, it can be often the result of a QRM caused by a station you can't hear. An open frequency does not always mean it is QRM-free on the other end. Try asking the question: "How clear is my frequency on your side?"

February: Maybe you read the rules for many of the small contests in *CQ* each month (there are 12 different contests in this month's calendar) but never try them out. Specialized contests (especially state QSO parties from *your* state) are an excellent way to hone your skills for the next big one. Try them out!

March: There are many factors to consider when trying to break a big pileup in a contest. One aspect sometimes forgotten is the way you call a station. If you sound like you really want to work someone (without getting carried away), you're more likely to beat the majority of stations that call with a more "laid-back" approach. Give it a try!

April: Contest club newsletters are an excellent source for ideas and "what's happening" in contest circles. Consider subscribing to a couple—especially if you are geographically isolated from a club near your area—to get the latest information on RFI protection, computers in the shack, operating tips, etc.

May: If you are a packet-assisted contester, always be sure to verify the callsign and exchange of the "spotted" station you are working. Many times a busted callsign has been spotted. Make the mistake appear on your screen—not in your log!

June: We often think about receiving antennas in terms of the 80 and 160 meter bands. Have you ever tried using a beverage (or similar antenna) on 40 meters? There have been countless times when a separate receiving antenna on 40 meters has dramatically improved my signal-to-noise ratio, more than compensating for reduced signal-strength levels. The bottom line is improved copying ability. I've even heard of limited success on the higher bands. Give it a try!

July: Want to know something that can help your contest score nearly as much as a big signal? For me, it's focus and utter concentration. Whether you're trying to lift a heavy weight in a gym or push a few more QSOs out of your station, the key is diligence and unabated attention to the task at hand. Consider another pastime you enjoy that requires intense concentration. If you apply the same techniques to contesting that you do in your other endeavor, your scores will climb—and without a single dB of added signal strength.

August: One of contesting's most difficult strategic decisions is to know when to stop calling a station in a pileup that you cannot work. Fortunately, most modern logging programs tell you specifically how many QSOs a new multiplier is worth. In the future, if your goal is to achieve the highest score possible, try to avoid wasted time calling an unworkable multiplier: (a) for that 40th Zone, (b) to obtain a clean sweep in the ARRL SS, (c) out of sheer stubbornness that may make a nice contest QSO but a lower final score!

September: Timing in big (or small) pileups is everything. By their very nature, the denser a pileup becomes, the harder it is to pull out callsigns—regardless of how good the operator is at the other end. A successful calling technique I use quite often is to wait a few seconds before calling with everyone else (SSB and CW). That slight delay and attentiveness to "sneaking-in" your call when others are catching their breath works time and time again! If only I had 25 cents for everytime a DX station has said to be in a pileup, "The Alpha Radio go ahead . . . " Using low-power in smaller contests to practice this technique will hone your calling skills even more for the big ones.

October: Have you ever thought much about your shack's operating chair? I always found it odd that we could invest $10K+ in our equipment, yet use an abandoned $25 operating chair found at a yard sale. When you consider the time invested in contest operating, think about the advantages in score than can come from a comfortable seat. You can't quantify it, but you can be sure your score will go up with comfort!

November: Try varying the phonetics you use in pileup calling. Sometimes a different word will help differentiate your call from the others. Sharp, piercing words are usually more effective. For example, GERMANY is probably better than GULF, or consider DENMARK instead of DELTA. As is so often the case in contesting, put yourself in the shoes of the operator you're calling.

December: I've heard from so many people about sending speeds in CW contests that I thought it was worthy of mention in this month's contest tip. If you're an experienced CW contester, try taking the time to occasionally slow down. There may be a number of more casual participants who are waiting in the wings to call you. The key is they need to be able to copy your callsign. You may be doubly surprised to snag a rare multiplier once in a while, too!

1995

January: None.

February: When does one QSY from a run frequency? This is one of the hardest operating strategies to learn in contesting. I tend to not overreact by moving too quickly. Think of it like the stock market: How many stocks have you sold at $20 per share in panic that eventually closed at $45 just three short months later? An extra 5–10 minutes of patience on a run frequency will often pay off in the long run.

March: With sunspots near a minimum, bands such as 160 meters are even more important to maximized contest scores. With my relatively small 3/4 acre New York lot, I had pretty much dismissed any serious operation on that band. However, a 70 ft. oak tree and 130 ft. of wire can support an Inverted L that has worked VP8SGP, T32J, and many others. Check out the Inverted L antenna . . . it's an easy passport to 160 meters and higher contest scores.

April: Nothing looks better on the Saturday evening of a DX contest than a good night's

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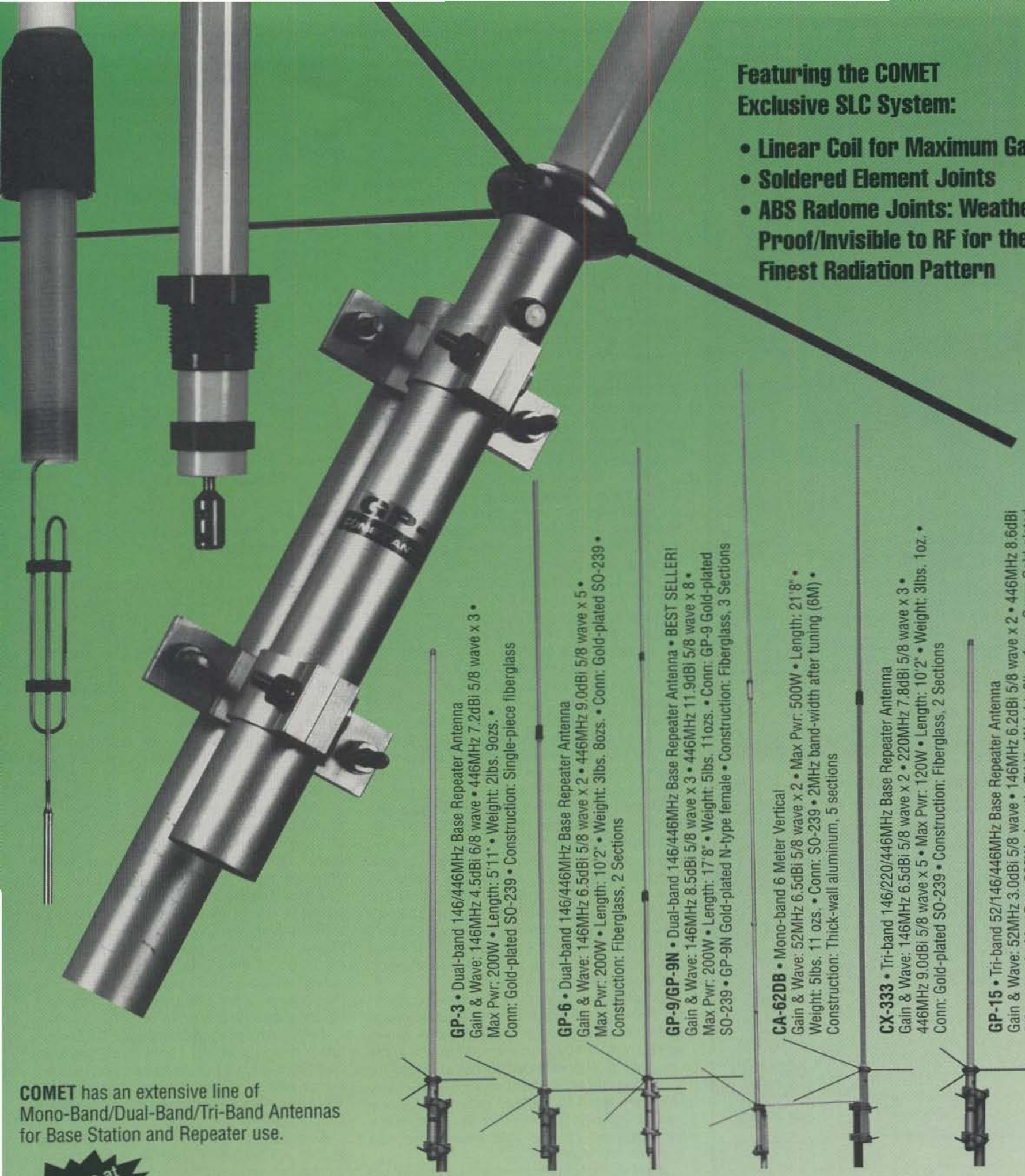

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Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

GP-15 • Tri-band 52/146/446MHz Base Repeater Antenna
Gain & Wave: 52MHz 3.0dBi 5/8 wave • 146MHz 6.2dBi 5/8 wave x 2 • 446MHz 8.6dBi
5/8 wave x 4 • Max Pwr: 300W • Length: 7'11" • Weight: 3lbs. 1oz. • Conn: Gold-plated
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sleep. Here are a few ideas to make sure you don't sleep too well. Try using two alarm clocks set 5 minutes apart to ensure that you actually wake up when you want to. If you have a guest room, use that "less comfortable" bed instead of your own. Finally, learn how to set your alarm clock(s) before the contest. There's nothing worse than trying to learn how to set an alarm clock (Is it AM or PM?) on 2 hours sleep!

May: It may seem obvious, but labeling antennas and amplifier settings is a must for contest stations. In the excitement of Friday afternoon it may be more tempting to work guys than take that final step towards efficiency. Paying attention to the details of preparation in the long run is what separates successful contest efforts from mediocre ones.

June: We say it every year. It's late May and there are over five months before the CQ WW SSB Contest. The next thing you know, it's October 15th and your 3-el 40 meter beam is still resting on saw-horses. Be up to the challenge. Make this the summer that you get an early start on your outside antenna projects!

July: In keeping with this month's theme of CQing, try varying your CQing style. Remember the most important information another station needs is your callsign, not the letters "CQ." You may want to "call CQ" occasionally by just signing your callsign two or three times, especially on CW. Calling CQ with less information, apart from your call, is always better than more!

August: Okay, so you've been hearing about all this talk of second radios and you're gazing at your old, beat-up TS830 saying, "but this doesn't apply to me." Although not nearly as efficient as a second radio, is the use of your second VFO on a single radio. Try calling CQ on one VFO and during periods of 5-10 second breaks tune with the other VFO. It may feel awkward at first, but it will allow you to call CQ more often and maybe put another 5-10 QSOs in your log per hour at peak times.

September: I don't know about you, but identifying the former USSR republics by prefix has become a formidable challenge for me. While most of the common logging programs provide the answers to "real-time" operating questions like this, there's nothing that can replace having it in your head. Studying current DXCC country charts and other sources to truly understand this week's version of our planet's prefix structure gives you one less thing to worry about when you're operating.

October: Contest rules are always changing. Although we make our best effort to report them accurately, even we get them wrong sometimes. Although you may think you know the rules of a contest that you've operated for years, the fact is that rules change all the time. Make the effort to "re-read" the rules for any contest you plan to participate in and you may be surprised how a little knowledge can improve your score!

November: Log checkers will usually tell you that incorrectly copied callsigns is the most common mistake in contest logs. When CQing and running other stations, always repeat the callsign of the other station you are working. Even though you may be absolutely certain that you copied the callsign correctly, a repeat of the call will allow the other station to correct any possible mistakes. It's worth the time!

December: Even though winter's fast approaching and the possibility of tower projects is fading, it's never too late to consider a wire antenna project. You'd be amazed how quickly you can get a signal on 160 meters for the upcoming 160 contests with a simple inverted "L" hung from a tree and four or five radials. Take a look through some of the antenna books and check it out. All you need is a good pair of gloves and you're well on your way!

1996

January: What happens when you drink coffee? You have a hard time sleeping, right? Have you ever wondered why you have trouble getting a "quality" nap the afternoon before a 48 hour contest? For me it's that morning coffee. After I stopped the Friday habit, I was able to physically prepare for the contest in a much improved way. Save the coffee for 0000Z that evening. You'll be amazed at the results!

February: I'm amazed at the number of top-notch CW contesters who can't copy conversational code. Sure, you can fire a callsign and exchange to them at 50 WPM, but don't dare ask what antenna they're using. In my book, code speed is more than ceremonial; it's one of the many factors that separate champions from everyone else. Never give up on improving your ability to copy QRQ CW. Finally, there's something that we learned from the 1980s that's worth remembering: Faster *is* better!

March: None.

April: It may seem obvious, but labeling items in your shack such as antennas, amplifier settings, relays, etc., is a must! If you haven't taken the time, revisit this area of shack housekeeping. Many station owners also label their coax feeds and/or rotator and control lines as well. It may prevent a catastrophic failure when you get serious in this fall's contest season.

May: Practice curing yourself of the bad habit of writing down callsigns/exchange information on a scrap paper while operating. This adds unnecessary overhead to your operating style and has become especially pointless with the advent of computer logging. The best way to reduce your "paper-dependence" is simply to eliminate any access to note paper altogether. Remember: If you want to walk, you've got to get rid of your crutch! (tnx K1ZX)

June: Take a standard mouse pad and punch or drill holes in the pad to correspond with the three feet of your keyer's paddle. The paddle feet are now touching the table top, so the height of the plastic your fingers touch is correct. However, you now have a giant surface area of rubber designed not to slide, holding the paddle in place (tnx K1VR).

July: Keep a few prepackaged CRT wipes handy during a contest. Looking at a dirty computer screen for 48 hours can be very distracting as well as create unnecessary eyestrain. You'll find them at K-Mart and most good office-supply stores (tnx AA3JU).

August: The month's of August and September are filled with great warm-up contests for the fall season. Check out the "Contest Calendar" and get involved. One way to add "dB" to your signal is to get your callsign in the minds of others. How do you do that? Get radio active—today!

September: Okay, not everyone has the circumstances that allow for three towers with stacked Yagis on all bands. There are more reasonable things that any contest station owner can do that don't require megabucks. And, with the contest season rapidly approaching, now is the time to implement! Consider your station from an antenna switching, external

noise filtering, band changing perspective. Pay attention to some of the construction/configuration ideas being promoted in sources such as *CQ Contest*, the *NCJ*, or the Contest Reflector. There are literally dozens of low-cost improvements that you can make to your station that will improve your scores. Be aggressive; check 'em out!

October: Are you continuously frustrated by your paddle moving about your operating desk? Now I don't mean the kind of "virtual" movement that occurs after 48 hours of nonstop contesting, but the type that happens while you're trying to send "Mississippi." One friend recently suggested that you take a quality mouse pad and drill holes that align with the feet on your paddle. Not only will it provide a more comfortable operating position, it will hold that paddle exactly where it belongs!

November: It seems that country prefixes are constantly changing. I still don't have all of the former Soviet republics completely figured out. Take a few minutes and review the latest country lists. It may direct your calling patterns in the next contest. Nothing is worse than calling a station for 10 minutes to eventually realize that it's not a new country. The opposite scenario (a.k.a. "lost opportunity") is even worse!

December: If you're like me, there are probably dozens of little problems in your shack. Here are a few examples: burned out lamps on your 930, Tailtwister control box, and amp, an intermittent coax switch position, torn headphone pads, a sticky "A" on your keyboard. Like most procrastinators, after you fix these things (usually in minutes), you say: "Why didn't I do that two years ago?" Well, fixing the small problems in your contest shack won't make you a better operator, but it will make your comfort level rise—and so will your scores. Get out that soldering gun. Are you up to the challenge?

1997

January: Depressed that all you hear is noise on 9M2AX's 80 meter frequency because you don't have the 500 square miles needed for proper beverages? Don't give up hope. I've found many times that using an antenna tuned for another band can often improve your receiver's signal-to-noise ratio so that you can actually copy guys not otherwise possible. Try using your 40 meter antenna as a listening tool on 80. Different combinations may work for other bands, too!

February: None.

March: Have you checked the direction of your antennas and compared them to what your rotator is telling you lately? During the last CQ WW Contest I spent most of the first day using a 3-el 40 meter beam that was 40 degrees off its proper alignment. A short walk out back can add dBs to your signal by deploying a little attention to detail. Forgetting the obvious will almost always lower your score!

April: Here's an often overlooked "transaction" in building contest scores: Share your contest operating plans with your significant other! While it may be risky to cross that chasm, the likelihood of arranging that "trip to Mom" may increase substantially, leaving you unencumbered to focus on your score, not making amends. After 20+ years of contesting (and nearly as many wedding anniversaries), I've learned that I'm still the only one in my family who knows what's really happening during the last full weekend of October.

May: None.

June: Are you struggling with a question about contesting and just don't know where to turn? Most of the contest world's leading contesters (at least the ones I know) are more than willing to share their knowledge. Don't be shy. Apply some elbow grease to your word processor and send a few letters to some of the guys you admire. I guarantee that not only will you be surprised with the rate of responses, but you may even discover a few answers to your questions *before* next year's contest season starts!

July: Whether you've experienced the loss of a contest log in the mail or not, this tip is for you. Unless you've joined the Internet computer revolution for log submissions, it still pays to include a postpaid post card with your paper entry. At the very least, it will serve as verification that your log was received. It also may afford you the opportunity to resubmit your "lost" log before it's too late. Nothing can improve a contest score more than ensuring it's received by the contest sponsor!

August: Preventive maintenance is not in the vocabulary of most hams, but it is a critical success factor to contesters. Our sport doesn't allow the clock to stand waiting during a contest while we solder a gamma match connection that really needed attention during the summer. Don't waste an opportunity to solve problems before they happen. With summer temperatures at their peak, take the initiative to put that climbing belt on and ensure your scores are maximized this fall!

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CIRCLE 81 ON READER SERVICE CARD

September: None.

October: Having recently moved (finally!), I've been thinking about the luxury I'll have to finally set up that new station the right way. While most of you may not be moving, we're always working on new antenna/equipment projects. You don't have do be involved in major station renovations to take on that next project with perfection in mind. Attention to detail (and a little luck) is what separates winners from losers in contesting. Bear that fact in mind the next time you want to skip soldering the coax connection on a dipole or improperly weatherproof your next gamma match.

November: This month I offer more of a safety tip than operating advice for contesters, but take a minute to read on. Contest season creates situations that make contesters do crazy things. I've spent more time on icy towers or climbing in treacherous winds than I'd care to recall. Do yourself a favor and remember that a key to doing well at contesting is to stay safe and alive. Be enthusiast, but also be smart this contest season. We'd like to work you next year, too!

December: Do you suffer from a perpetual lack of organization? If so, you're like most of us. A tip learned from one of my contesting mentors, Jim Lawson, W2PV, is to document your station. Do you know what size wrenches you need when you go up the tower next time? What are the resistance readings of your rotator between pins? How is that 4 over 4 relay box constructed? The list goes on, yet a little attention to administrivia will go a long way to make you a better contester (tnx W1WEF and YCCC Scuttlebutt).

Final Comments

Here are several more corrections to the WPX SSB Results printed in the March issue. The QRP winner should have been N7VY, not KC6ETY. Omitted from the results was F6IRA, Single-Op All Band, score 401,132.

Remember, deadline for material for the August column is June 1st.

73, John, K1AR

ARI International DX Contest

2000Z Sat., May 2 to 2000Z Sun., May 3

This is the annual edition of the Associazione Radioamatori Italiani's international DX Contest. The ARI DX Contest is managed by veteran contester I2UIY and should offer a significant amount of activity. Stations are allowed to work each other worldwide.

Classes: Single Operator SSB, CW, or RTTY; Single Operator Mixed; Multi-Single Mixed; and SWL Mixed.

Frequencies: 160 through 10 meters (no WARC bands) according to the IARU band plans (RTTY is 80–10 meters). All stations (including single operator) must adhere to the standard 10-minute rule.

Exchange: Italians send RS(T) and province; all others send RS(T) and serial number.

Points: QSOs within your own country count only for multiplier credit. Count 1 point for QSOs inside your own continent, 3 points for QSOs outside your continent, and 10 points for Italian QSOs. Stations can be worked once per band and mode (e.g., 15 CW, SSB, and RTTY).

Multiplier: Italian provinces (103) and DXCC countries (not I or ISØ). Credit multipliers only once per band.

Scoring: Final score is sum of QSO points times the sum of multipliers.

Awards: A plaque will be offered to the highest scoring station in each class. In addition, a certificate will be awarded to the top two to five placing stations, as well as the leading scorers in each DXCC country.

Special Award: Two large, very attractive plaques will be awarded by the Santa Barbara Contesters in memory of IN3ANE. They will be given to the best OM score under 21 years old and the best SWL score under 18 years old.

Free logging software is available for the ARI Contest. You can obtain your copy directly from the contest manager ($5 or 10 IRCs for expenses). Entries may be submitted on diskette in N6TR, K1EA, EI5DI, or ASCII format. Logs must be mailed 30 days from the end of the contest to: ARI Contest Manager, I2UIY, P.O. Box 14, I-27043 Broni (PV) Italy.

MARAC County Hunters CW Contest

0000Z Sat., May 2 to 2400Z Sun., May 3

The Mobile Amateur Radio Awards Club is sponsoring the 32nd Annual County Hunters CW Contest. Mobile, Portable, and Fixed operation from every U.S. county is welcomed, and operation from less active counties is encouraged. Fixed stations may be worked only once on each band. Mobiles and Portable (identified by signing /M or /P after call) may be worked each time they change county or band; and when operating on county lines count as one QSO, but the receiving station may count each county as a separate multiplier. To be eligible for an award, a station must not operate more than one transmitter at one time.

Exchange: Signal report, county, and state for U.S. stations. Signal report, province (Canada) or country for other stations.

Scoring: QSOs with fixed U.S./Canadian stations are worth 1 point; mobiles and portables are worth 15 points. US/Canadian contacts with DX are worth 5 points. Contacts with stations operating under a "Net Control" are invalid for contest purposes. Final score is total QSOs times the total number of U.S. counties worked. Mobiles and Portables changing states during the contest should calculate their scores for (1) individual state certificates and (2) total score for the overall plaque. Total overall score must not count a county as a multiplier more than once regardless of the county or the band.

Frequencies: 3.575, 7.040, 14.050, 21.050, 28.050. Fixed stations should operate above the suggested frequencies and allow low power mobiles to operate below the suggested frequencies.

Awards: MARAC contest certificates will be sent to winning stations as follows: first-place fixed in each state, province, and country; first-place mobile in each state; first-place portable in each state. MARAC contest plaques will go to winning stations as follows: 1st and 2nd place Mobile in the U.S., 1st place Portable in the U.S., 1st and 2nd place U.S. Fixed station, 1st place Canadian station, and 1st place DX station. For contest purposes, DX is any country other than the U.S., Canada, and Mexico.

Send completed logs and summary sheet by June 5, 1998 to Norm Beavers, W3DYA, 3320 McMillan Drive, Tyler, Texas 75701-8239.

Massachusetts QSO Party

1800Z Sat., May 2 to 0400Z Sun., May 3
1100–2100Z Sun., May 3

Work Massachusetts in this popular QSO party sponsored by the Framingham Amateur Radio Association. Stations in Massachusetts may work any station. All others may work only Massachusetts stations. Fixed stations may be worked once per band per mode. Mobile or portable stations may be worked once per Massachusetts county/state. Permitted modes are phone and non-phone (CW, RTTY, ASCII, AMTOR, GTOR, PACTOR, CLOVER, SSTV/ATV, and Packet), digipeater node, land-based ATV repeater, and amateur satellite transponder operation. Land-based repeater contacts are not permitted.

Classes: Non-Massachusetts stations, Massachusetts Single Operator Unassisted (single operator performs all transmitting, receiving, and logging), Massachusetts Multi-Operator (single or multi-transmitter)—all transmitters located within a 300 meter diameter circle, Massachusetts Mobile/Portable, and Massachusetts Teams (up to 5 single operator members).

Exchange: Massachusetts stations send signal report and county, non-Massachusetts stations send signal report and U.S. state, Canadian province, or DXCC country.

Frequencies: CW—1.810, 3.550, 7.050, 14.050, 21.050, 28.050, 144.070, and 432.090 MHz. SSB—1.850, 3.890, 7.290, 14.270, 21.390, 28.390, 144.220 (SSB), 146.550 (FM), 432.150 (SSB), and 446.000 (FM) MHz. Novices—3705, 7130, 21130, 28130 and 30 kHz up from the band edge.

Scoring: One point per phone QSO, two points per non-phone QSO. Multipliers are: *Massachusetts stations*—total number of Massachusetts counties, U.S. states (excluding MA), Canadian Provinces and DXCC countries (excluding U.S., Canada, Alaska, and Hawaii) worked on each band. *Non-Massachusetts stations:* Total number of Massachusetts counties worked on each band (maximum 14 per band). Washington DC contacts shall be counted as a Maryland QSO. Final score is total QSO points multiplied by the sum total of all multipliers worked.

Awards: Certificates will be awarded for the highest score in each of the five entry categories—U.S. State, Canadian Province/Territory, and DXCC country, Massachusetts Club entry, Novice/Technician entry in each category from the state of Massachusetts, single operator entry from each Massachusetts county. In addition, certificates will be awarded to entrants working all 14 Massachusetts counties. Additional certificates may be awarded at the discretion of the organizers.

Electronic and printed entries are permitted. Electronic entries should be in either ASCII (e.g., ARRL format) or CT.bin file format. Electronic entries should be sent to <n1tyh@aol.com>. Printed entries must be postmarked no later than 30 days after the end of the contest and sent to: Massachusetts QSO Party, c/o Framingham Amateur Radio Association, P.O. Box 3005, Framingham, MA 01701.

Connecticut QSO Party

2000Z Sat., May 2 to 2000Z Sun., May 3
Rest Period: 0400–1200Z, May 3

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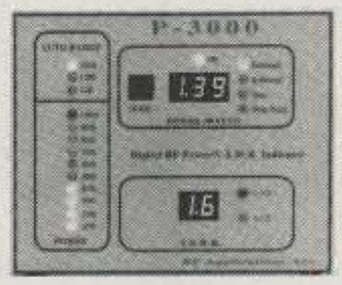

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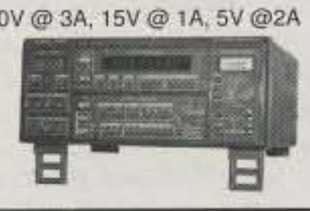

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Candlewood Amateur Radio Association and is open to any amateur. The object is to work as many Connecticut stations as possible on 160–2 meters.

Classes: Single Operator—fixed, mobile, Novice, QRP (5W), Multi-Single or Multi-Multi stations, and Connecticut club competition.

Exchange: Single report and county or state/province/DXCC country.

Frequencies: CW—40 kHz up from lower band edges, Novices operate 25 kHz up from lower band edges. SSB—1860, 3915, 7280, 14280, 21380, 28380 kHz. VHF—50150, 144200, 146580 kHz. RTTY—normal operating frequencies.

Scoring: Credit one point per phone QSO, two points for CW/RTTY. QSOs with club station W1QI and ARRL HQ station W1AW count 5 points. Final score is total QSO points times the number of stations/provinces/DX (DX only counts as a single multiplier) worked. Others use Connecticut counties as the multiplier.

Awards: Plaques and certificates (100 point minimum) will be awarded to category winners. A special certificate will be sent to anyone who works all 8 Connecticut counties.

Send your results no later than June 3rd to: CARA, P.O. Box 3441, Danbury, CT 06813-3441.

CQ-M International DX Contest

2100Z Sat., May 9 to 2100Z Sun., May 10

The Krenkel Central Radio Club of Russia invites all radio amateurs of the world to participate in the 42nd CQ-M ("Peace to the World") International DX Contest. Operation is permitted on all amateur bands (no WARC activity) on CW, SSB, and SSTV.

Classes: (1) Single Operator—single or multi-bands (CW only, SSB only, mixed mode, satellites); (2) QRP—mixed (CW and SSB), output power limit is 5 watts; (3) Multi-Operator—multi-band, single transmitter, mixed (CW and SSB); (4) SWL—multi-band, mixed (CW and SSB); (5) World War II veteran—single operator, multi-band, mixed (CW and SSB); (6) SSTV—single or multi-operator, multi-band, SSTV only.

All multi-band categories must remain on the same band for at least 10 minutes after the first QSO has been made. All mixed mode categories may make only one QSO with the same station on that band. For example, if a QSO with a station is made on a band by using CW, a second SSB QSO gives neither points nor multipliers on the same band.

Exchange: RS(T) and QSO serial number, starting from 001.

Scoring: QSO with own "P-150-C" country 1 point; QSO with another "P-150-C" country in the same continent 2 points; QSO with other continent 3 points. Each country in the "P-150-C" award country list counts as a multiplier only once on each band. SWLs have no multipliers. Final score is the sum of QSO points on all bands, multiplied by the sum of multipliers on all bands.

Awards: Trophies will be awarded to the world's top-scoring stations in the major categories. Medals will be awarded to each top-scoring station in each continent in the major categories. Certificates will go to the world's top ten scoring stations, a continent's top three, and each country's winner in each category.

Send logs to: CQ-M Contest Committee, Krenkel Central Radio Club of Russia, P.O. Box 88, Moscow, Russia, no later than July 1, 1998. Electronic logs may be submitted via the Internet to <cqm98@mai.ru>. Only ready-to-print ASCII data (ARRL suggested format, N6TR.dat, etc.) placed in the body of a message will be accepted. *Do not* send binary files. A confirmation will be sent to each entrant within a week. If you do not receive a confirmation, send a query to <rw3fo@qsl.net>. In case of no reply, you should send a printed copy of the logs by airmail.

Nevada QSO Party

0000Z Sat., May 9 to 0600Z Sun., May 10

Here's a great chance to work this rare state by participating in the Nevada QSO Party sponsored by the Frontier Amateur Radio Society. The rules were rather sketchy, but operation is planned on 160–6 meters. Look for Nevada sta-

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UG-21B/U	N Male RG-8 , 213, 214 Kings	5.00
9913/PIN	N Male Pin for 9913, 9086, 8214 Fits UG-21 D/U & UG-21 B/UN's	1.50
UG-21D/9913	N Male for RG-8 with 9913 Pin	4.00
UG-21B/9913	N Male for RG-8 with 9913 Pin	6.00
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UG-83B/U	N Female to PL-259, Teflon USA	7.50

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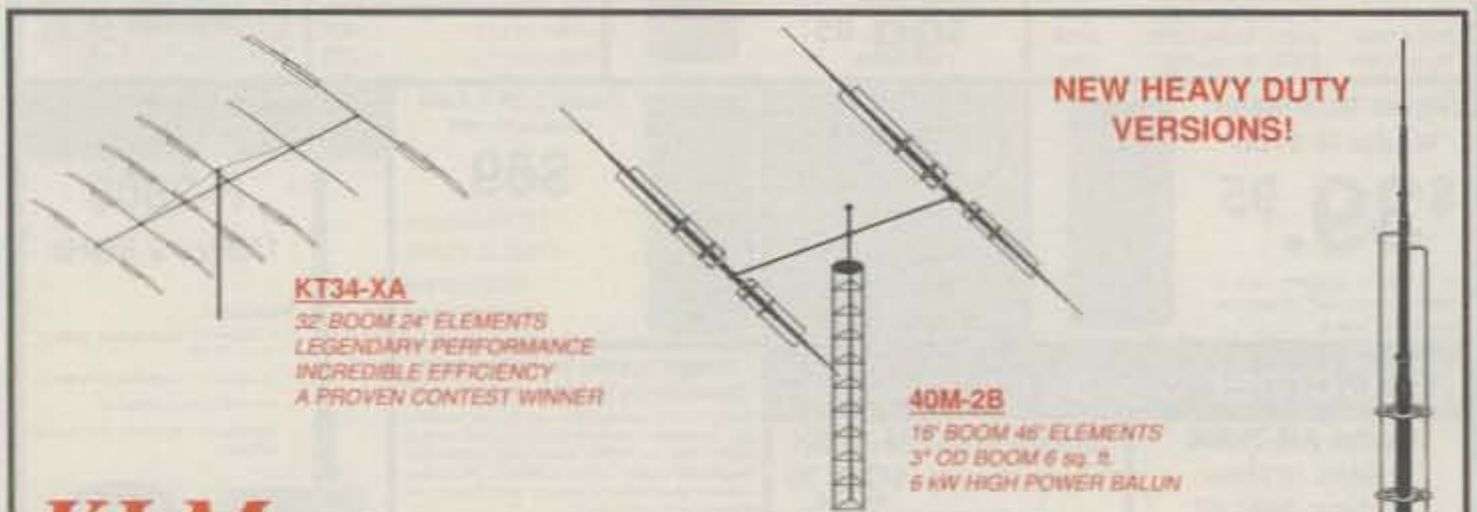

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CIRCLE 58 ON READER SERVICE CARD

tions on CW, 15 kHz up from the bottom of the General band and 25 kHz up on SSB.

Exchange: Signal report and Nevada county or state/province/DXCC country.

Scoring: Credit 2 points for CW/RTTY contacts and 1 point on SSB. One contact is allowed per band and mode. Final score is multiplier (usual counties/state totals) times total QSO points.

Awards: Certificates will be sent to all winners. Send your logs before June 15th to Jim Frye, NW7O, 4120 Oakhill Ave., Las Vegas, NV 89121-6319.

Texas QSO Party

1400Z Sat., May 23 to 0500Z Sun., May 24
1400–2000Z Sun., May 24

Here's a fun event sponsored by the Texas DX Society. As with most QSO parties, Texas stations work everyone, while others work Texas stations only. You may work stations once per band and mode. Expedition stations (i.e., mobiles) may be worked in each county they activate. Multipliers only count once regardless of number of bands/modes worked.

Classes: Single operator, Multi-Single and Multi-Multi, Texas Mobile Single and Multi-Op, QRP Single and Multi-Transmitter, and Club Aggregate category.

Exchange: RST and state (province, country, or maritime region). Texas stations use RST and county.

Scoring: Credit two points per phone QSO and three points per CW and other digital-mode QSO. Non-Texas stations use the number of Texas counties worked as multipliers (total of 254 plus an Armadillo County mystery station; Texas stations use number of Texas counties, states, Canadian provinces, and DX countries (less USA, Canada, Hawaii, and Alaska). Add bonus points to your final score: non-Texas stations add 100 points for *every* 10 Texas mobiles worked per band/mode. Texas stations add 100 points for *every* 10 Texas mobiles worked per band/mode. Texas mobiles add 5,000 points per every 5 counties covered with at least 5 contacts per county and add 100 points for *every* 10 Texas mobiles worked per band/mode. Final score is total QSO points times multiplier (counties or states/provinces).

Frequencies: CW—30 kHz up from lower band edge; SSB—25 kHz up from lower General class band edge; VHF—50.200, 144.200. Send logs and dupe sheets (if over 200 QSOs) by June 5, 1998 to TDXS, P.O. Box 540291, Houston, TX 77254 or via e-mail to <W5HNS @aol.com>. For a complete set of rules see TDXS's Web site at <http://wb5fnd.tech.uh.edu:80/~tdxs/>. The TQP is supported by NA and TR contest logging software.

CQ WW WPX CW Contest

0000Z May 24 to 2400Z May 25

Complete rules were in the January issue of *CQ*. Rules and summary/log sheets can be obtained from CQ Communications, 25 Newbridge Road, Hicksville, NY 11801. Check the rules (January 1998 issue of *CQ*) for the current trophy list. As with all *CQ* contests, be sure to indicate the mode of operation on your envelope when you mail your logs. Results of the 1997 WPX CW Contest can be found elsewhere in this issue.

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CAROLINA WINDOM 160, 160 -10m, 252' Big Bang	$119.95
BigSig 40, 3/2 wave loop, 40 m, 110' A Sizzler	$69.00
G5RV Plus, 80-10m, 102'+ High Power Current Balun	$57.95

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Y1-5K	1:1	5 KW	160 -10 m The YagiBalun™	$33.95
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R2 Rotator	8 conductor (2 x #16, 6 x #18) SALE	47¢/35¢
#14 HD	Stranded, 7 x 22 hard-drawn	8¢
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#12 FlexWeave™	259-strand, excellent for longer runs	19¢
450 Ladder	#16 stranded cond, windows SALE	22¢/16¢
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CIRCLE 73 ON READER SERVICE CARD

BY TED MELINOSKY, K1BV

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we profile Wally Teto, KT1M (ex-N1JAC), USA-CA #942, November 11, 1997. Following are his history in amateur radio and his experiences in county hunting.

"I am 49 years old and have been married for 24 years to my wife, Patti. We have two boys, Matt (KA1YTR) age 20, and Robbie, age 15. Matt is a junior at WPI majoring in civil engineering and is president of the WPI ham radio club (W1YK). Robbie is a sophomore in high school, and has no interest in amateur radio. However, he spends a lot of time with me kayaking and target shooting. My other interests include bicycle riding (about 5000 miles per year) and mountain climbing. I spend time as a volunteer in trail maintenance and search and rescue at Mt. Monadnock State Park in southern New Hampshire.

"Patti is really very tolerant of all my interests and understands the need to be buried under a set of headphones for hours at a time. She compensates by playing the piano and sewing, so I guess we're even! I manage in my spare time to hold down a second-shift job as a nuclear welding inspector.

"I was first licensed in April 1991 as KA1YLX, upgrading to General and receiving the call N1JAC. I passed my Extra exam shortly after that, changing calls when the Vanity Program came along. I had been interested in ham radio back in the '60s but never got the 'push' to get licensed. Instead I spent many enjoyable evenings SWLing on the shortwave broadcast frequencies. (While my mom thought I was asleep, I would be looking for the elusive DX stations at 2 AM on a school night!) Finally my son's desire to become a ham prompted me to look into getting a license. A close friend of mine, Charlie, WN1E, has a station, and our visit to him got both my son and me pretty excited about the hobby. We studied together and received our Novice tickets just before the current No-code Technician program went into effect.

"My main interest is, and always has been right from the start, HF operating. DXing and HF contesting seem to take up most of my time spent on the bands. I began to enjoy RTTY operating, and in 1993 started a weekly sked with SV2BFN, Vangelis, in Thessaloniki, Greece, whom I had met in a QSO. He was a Boston Celtics fanatic, and since I lived in the area, he bombarded me with questions about them and wanted to know if I could get him a T-shirt. Well, the gift and more frequent QSOs led me to finally visit him and his wife in 1994 and operate in the 1994 CQWW RTTY contest from Greece.

"Upon my return, I stumbled across the 14.336 County Hunter Net, and with the sunspot cycle on a downward plunge and the DX a bit infrequent, I began to make contacts on the SSB and 20 meter CW nets. I found I had run into a really enthusiastic group of amateurs and caught the County Hunting 'fever' as a result. Soon I was not only working counties on the net, I was 'putting them out' in my mobile as well. Even my wife enjoyed going along on these trips, mostly in New England and New York.

"Now that I have finished my mixed mode USA-CA, I am back to DXing and contesting again. But with still about 1000 more counties needed on CW, I'm sure I'll be making the effort to eventually finish them up there as well. I probably will not 'go around' again, as there are so many other interesting facets of amateur radio that I would like to sample, but I won't forget the wonderful folks on the County Hunting nets.

"I could not begin to thank those who helped me along the way, but I did want to thank especially Ed, WA6VJP (SK), who really got me going on the CW net and was my main motivation to help out as a net control even though I could never do the job as well as he did. Also thanks to Elwood, KA3MMM, who got me my last county (Vinton, OH) on 40 meter CW. I'll still be visiting my friends on the net and hope to put out more New England counties in the future for them."—*KT1M*

65 Glebe Road, Spofford, NH 03462-4411
e-mail: k1bv@top.monad.net

USA-CA Special Honor Roll

Thomas Winfeld, WA9LKD
USA-CA All Counties #946
January 27, 1998

Jeffrey P. Bencher, W9MSE
USA-CA All Counties #947
February 19, 1998

USA-CA Honor Roll

500
3006.....KM5JY
3007 .....WA9LKD
3008 .....W1ENE
3009.....UA1ABO
3010.....UAØFZ
3011.....K7TED
3012.....W4ZAA
3013.....LX1KC

1000
2467 .....WA9LKD
2468 .....W1ENE

1500
1224 .....WA9LKD

2000
1127 .....WA9LKD

2500
1054 .....WA9LKD

3000
963 .....WA9LKD

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from *CQ* Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated March 1, 1997. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 65 Glebe Road, Spofford, NH 03462-4411 USA. DX stations must include extra postage for airmail reply.

Special Endorsement Mention

To W9MSE, who submitted paperwork for his All CW award, and KA3MM, who earned USA-CA 3076 #847 and submitted additional cards for an AllL Mobile award, welcome into the ranks of highly recognized County Hunters!

For those who keep track of such things, the award sequence numbers for the 1000 level since January contain an error. Arnie, K9DCJ, called this to my attention. It appears that the number information I used contained a typographical error which increased the number by 1000. So, in fact, W9LKD's 1000 real number should be 1467 and W1ENE's should be 1468. I'll mark my records so that these numbers will not be re-issued.

Awards Available

Pennsylvania Keystone Award. The Keystone Award is one of the first awards I earned back in the 1960s, so I'm really pleased to feature it this month. Issued by

KEYSTONE AWARD
HARRISBURG RADIO AMATEURS CLUB
PRESENTED TO
SAMPLE HAM
OPERATOR OF AMATEUR RADIO STATION
SAMPLE
HONORING HIS ACHIEVEMENT
IN HAVING COMMUNICATED WITH ONE HUNDRED
AMATEUR RADIO STATIONS IN THE COMMONWEALTH OF
PENNSYLVANIA

Pennsylvania Keystone Award issued by the Harrisburg Radio Amateurs Club.

Say You Saw It In CQ

the Harrisburg Radio Amateurs Club, its goal is to promote two-way contact with amateurs in the Commonwealth of Pennsylvania. Direct two-way contacts with 100 different Pennsylvania stations are needed after a starting date of January 1, 1957. No use of repeaters. Send an alphabetical-by-call list of the stations. The list must include station call, date, time, band, mode, and the following statement: "I certify that the above list is a true record of the contacts of Amateur Radio Station (your call). For US stations, the fee for the award is $3.00; all others, just 3 IRCs.

Endorsements are available as follows: Novice—work 25 different Pennsylvania stations in each calendar year. 100 Pennsylvania Stations—work 100 different Pennsylvania stations in a calendar year. Fee for endorsement is $1.00 for US and 1 IRC for all others. Endorsements may be earned each year. To earn both endorsements in a calendar year, a total of 125 different stations must be worked, of which 25 must be in the Novice category.

The best time to work large quantities of PA stations is during the PA QSO Party, held each year in October. This is one of the two really big state QSO parties, and literally hundreds of stations are very active. For the award apply to: Mark Robinson WB3JIS, 1235 Middletown Road, Hummelstown, PA 17036-8929.

The IVCA DX Achievement Award issued by the International Visual Communications Assn. for working at least 50 different countries using two-way SSTV.

IVCA DX Achievement Award. The International Visual Communications Association offers a Slow Scan TV DX Award for showing proof of working at least 50 different countries using two-way SSTV. Additional endorsements in blocks of 25 countries are also available. The ARRL DXCC countries list will be used to define the countries. Membership in the IVCA is not required; the award is available to all SSTV operators. There is no fee for the award, but the sponsor requires that the cards used for the achievement be sent along with sufficient postage for their return. As of December 1997, only eight awards have been issued to the following

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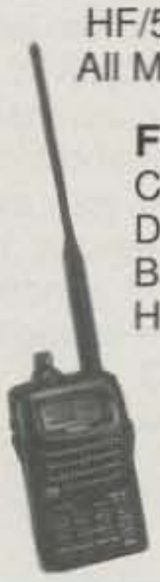
FT-50RD
Compact Dual Band Handheld



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1130 RG213/U 95% shield mil spec NCV jkt ..... .36
1140 RG214/U dbl silver shld mil spec 1.85
1705 RG142B/U dbl silver shld, teflon ins 1.50
1450 RG174/U 50 ohm, 100" od mil spec ..... .14
1410 RG58/U mil type 50 ohm 95% shield ..... .12

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UG21D N plug for RG8,213,214 ..... 3.35
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UG255 SO239 to BNC plug adapter 4.75
SO239AM UHF chassis mt receptacle, Amphenol 1.50
UG88C BNC plug RG58,223,142 ..... 2.09

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Samara Award. In the early 1990s, concurrent with the formation of the Russian Republic, award activity from the USSR blossomed. Subsequent economic problems, including inflation and lack of postal security, reduced this activity dramatically. Most of my Russian award contacts just couldn't afford to spend a day's pay to send an airmail letter with award information. Some rare instances, however, show that the interest in handsome radio awards is still alive. Here is one such example from Vlad, RW4HO.

The Samara (Russia) Award.

The city of Samara, after which the Samara Award is named, was founded in 1586. In order to get this award, you need to earn 1586 points by making contacts valued as follows:

a. Each QSO with an amateur of Samara area who is a veteran of the "Great Patriotic War" (we call it WW II). They use special callsigns such as U41– and U4H–. Value = 100 points.

b. Each QSO with a station in Samara using special callsign sequence such as RP4H–, UE4H–. Value = 100 points.

c. Each QSO with a station located in Samara city = 50 points.

d. Each QSO with a station located in Samara area = 25 points.

All contacts must be made on or after May 1, 1995. SWL okay. Send a GCR list and fee of $5 US, 15000RUR, or the equivalent IRCs to: Vladimar Stepnov, RW4HO, P.O. Box 6830, Samara-10, 443010 Russia.

Diploma Lisboa, Expo 98 Award. Portuguese amateurs are permitted to use the special prefixes of CT98, CS98, CQ98, and CU98 during the period January 1 to September 30, 1998. This is to commemorate EXPO 98 beginning in Lisbon starting May 22nd, the theme of which is the United Nations declared "Year of the Oceans." The Portuguese National Radio Club is sponsoring an award for making contact with these designated stations.

Contact special-prefix Portuguese stations during the above time period using all modes and bands. Portuguese stations need to earn 50 points, other Europeans need 30, and all others need 20 points. Point values are: CT98EXPO = 10; CT98REP = 5; all other CT98, CS98, CQ98, or CU98 = 2 points each. Contacts may be made with the same station on different bands or modes for added credit. No QSLs are required; just submit a signed list of the contacts and points earned on or before June 30, 1999. Send to: REP Award/Contest Manager, Apartado 2483, 1112 Lisboa Codex, Portugal. The fee is 2 IRCs for European applicants and 3 IRCs for everyone else. There are no other charges.

The Worked Contest Club Finland Award. The column's last award is one I had just received from the Finnish Contest Club. If you've participated in DX contests, it's easy to get the impression that one of the big industries in Finland is aluminum smelting and fabrication. as they're busily making a wide variety of tubular aluminum products for their contesters! I learned of the existence of this award from an Internet DX Reflector posting and the timing was right for the Scandinavian Contest. Most of the contacts were made during the CW weekend, with the remainder during the SSB weekend. As you can see, I added a few extra contacts. Their membership list is quite large and includes past or special expedition calls. You can print a copy of it from their Internet WWW location found at <http://www.teuva.fi/~oh6yf/ccf/wccf/htm>. Here are the rules:

Contact club members during any contest on or after June 1, 1997. Finnish stations must contact 80 members, other EU need 40, all others 20. GCR list must include date, time, station, band, mode, RST sent, RST received, and name of the contest. Finland is a hotbed expert contest activity, and just about every one these participants is on the list. You should be able to work this award easily during the Scandinavian Contest held each September. Fee is 40FIM or US$8. Apply to Pasi Alanko, OH1MM, Nasiantie 20 As2, FIN-28660 Pori, Finland. (Info from Internet 98).

Say You Saw It In CQ

The W6P National Law Enforcement Officers Memorial Special Event

The COPS Contest Club will operate special event station W6P to honor peace officers who have given their lives in the line of duty. The operation will take place during National Police Week, May 10 (0000Z) to May 17 (2400Z), 1998. Look for activity on or near the following frequencies: 3890, 7290, 14290, 21390, 28490. All that's required to earn this handsome certificate is one contact confirming a QSO with W6P. They do ask, though, that you send along a 9" × 12" envelope with 78 cents postage to: K6BZ, P.O. Box 252, Igo, CA 96047.

URL of the Month

The Radio Club of Argentina has a well-done site with rules in both English and Spanish at : <http://webs.satlink.com/usuarios/l/lu5gpl/index.htm>.

Remember, I'm still looking for you to send me samples of your club or national society award series. Send information to the address shown at the beginning of this column. 73, Ted, K1BV

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WASHINGTON, DC

National Law Enforcement Officers MEMORIAL

SPECIAL EVENT STATION

W6P OLICE

This certifies that Amateur Radio Station_____ Contacted station W6P on _____ during National Police Week. W6P was operated by members of The Cops Contest Club. This operation took place in Shasta County, California. Contact time _____Frequency_____ Signal Report_____ Mode_____.

Jerry Boyd K6BZ
President, Cops Contest Club

CERTIFICATES COURTESY OF HAM RADIO OUTLET

The W6P National Law Enforcement Officers Memorial Special Event certificate issued by the COPS Contest Club.

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RG8/U STRD BC FOAM 95% BRAID UV RESISTANT JKT 0.9dB/1350WATTS @ 30MHz .32/FT .30/FT .28/FT
RG8 MINI(X)95% BRAID UV RESISTANT JACKET 2.0dB/875 WATTS @ 30MHz .15/FT .13/FT .12/FT
RG58/U 95% BRAID UV RESISTANT JACKET 2.5dB/400 WATTS@ 30MHz .15/FT .13/FT .11/FT
RG58A/U STRD CENTER 95% TC BRD UV RESISTANT JKT 2.6dB/350 WATTS @ 30MHz .17/FT .15/FT .13/FT

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RG142/U SOLID SCCS 2-95% SILVER BRAIDS TEFLON JKT 8.2dB/1100WATTS @ 400MHz .25FT/UP 1.25/FT
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RG11/U SOLID BC (VP-78%) 95% BRAID NC/DB/UV JKT 1.1dB/800WATTS .40/FT .38/FT .36/FT
RG11A/U STRD BC (VP-66%) 95% BRAID NC/DB/UV JKT 1.3dB/1000WATTS .42/FT .40/FT .38/FT
RG6/U CATV FOAM 18GA CC8 FOIL + 60% ALUM BRAID .14/FT .12/FT .10/FT

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1216 8/COND (2/12 6/16) BLK UV RES JKT. Recommended up to 500ft. .78/FT .74/FT .70/FT
2206 22GA STRD 6/COND PVC JACKET .18/FT .16/FT .14/FT
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BY CHOD HARRIS, VP2ML

The DXer's Guide to Dayton

Dayton. The very word conjures up intense emotions among most amateurs. The Dayton Hamvention is certainly the best known mega-convention in amateur radio. The Hamvention attracts tens of thousands of amateurs from all over the world to southern Ohio. Among these many thousands are hundreds of dedicated DXers. Here is how a typical DXer might spend his or her weekend in Dayton, Ohio.

DXers (and many other amateurs) aim to arrive in Dayton on Thursday, May 14 this year. Those DXers who planned a year in advance will head for DX Central—the Crowne Plaza hotel, across the street from Dayton's convention center in downtown Dayton. Once checked in to the hotel, which used to be called Stouffers, DXers will collect on the second floor, where the contesters have a no-host bar set up. Also look for DXers in the lobby by the registration desk. The informal get-togethers can run late into the night.

On Friday DXers who have fleamarket needs head out toward the Hara Arena early in the morning. The rest of us sleep late (because we're going to need that extra sleep) and catch the shuttle bus out to the arena after it opens at around noon. There are seldom any DX-related activities at the arena on Friday, so use the afternoon to check out the fleamarket or the commercial exhibits. The crowds are not quite as dense as they will be over the weekend, so this is a good time to talk to some of the manufacturers' representatives about new radios and features.

Arrange to get back to the hotel well before the 6:30 PM no-host cocktail party one flight up from the hotel lobby. Most DXers don coat and tie or the equivalent for the DX dinner, hosted by the local SouthWest Ohio DX Association. (You did order your tickets for the dinner early, didn't you? Tickets are seldom available at the Hamvention.) More information about the 12th annual DX dinner is available from Steve Bolia, N8BJQ, at <n8bjq @erinet.com> or 937-788-2803 days.

Following the DX dinner, DXers change back into less formal attire for the cruise through the popular hospitality suites. Look for signs announcing the suites in the hotel lobby and elevators, or just follow the crowds. The suites are easy to find. The Kansas City DX Club puts on an excellent suite with videos and a very taxing CW copying competition. Sometimes DXpedition operators have QSL cards or souvenirs available. The action continues well into the night. Hint: The stairs opposite the hospitality suites are often better paths to the other suites than the often-overtaxed elevators.

On Saturday DXers (and everyone else) head back to the Hara Arena. However, this year the big DX and Contest Forums have been moved from the Hara Arena to the Meadowdale High School. The Hamvention has promised shuttle buses. The DX Forum includes DXCC and DXAC reports, DXpedition reports, and other topics of interest. DXCC coordinator Bill Kennamer, K5FUV, often sits near the DX forum door, checking QSL cards for DXCC.

Again Saturday evening DXers return to the Crowne Plaza for the hospitality suites. The contest dinner is Saturday evening as well. Unlike Friday, the suites are busier earlier in the evening, as they are competing with the DX dinner. Every well-known DXer can be found in one or another of the suites, so move around.

Sunday the hotel lobby is the hot DX spot. As the DXers check out (and reserve their rooms for 1999), they offer one last opportunity to meet them. While some will return to the arena for one more day of too many exhibitors and too much fleamarket, many DXers will start the long trip back to their homes, happy to have survived yet another Dayton.

P.O. Box 50, Fulton, CA 95439
e-mail: chod@compuserve.com

Famous DXer Iris Colvin, W6QL, passed away on February 18. (W6NW photo)

Iris Colvin, W6QL, Silent Key

Iris Colvin, W6QL, passed away on February 18th at her home in Richmond, California. She was 83. Iris was born in Oregon, and graduated from the University of California at Berkeley in 1938 with a major in art. She studied brush painting in Japan and painted many Japanese-style watercolors. Iris married Lloyd Colvin, then a colonel in the army, in 1939. (Lloyd passed away on a DXpedition in 1993.) Iris held an Extra class amateur radio license and was a member of the ARRL, RCA, QCWA, past president of the Northern California DX Club, and president of the Yasme Foundation for the promotion of international amateur radio. With Lloyd, Iris visited 223 countries, operating amateur radio from the majority of them. Lloyd and Iris would typically rent a villa in a target country for about a month, putting up antennas for most bands. Lloyd handled the CW while Iris was often found in SSB DX nets, ensuring that the pair worked at least 100 DXCC countries from each location. She was much in demand for YL-DXCC chasers, as she would often be the first YL on from some countries. She continued DXpeditioning into her late

70s. Over the years, Lloyd and Iris made more than one million contacts and amassed what is thought to be the world's largest QSL card collection, at more than half a million. She was on the DXCC Honor Roll and was elected to *CQ*'s DX Hall of Fame in 1976.

The "ARRL Letter" added: "The ARRL Board of Directors recognized the Colvins' contributions to international goodwill by naming them Amateur Radio Ambassadors of the Decade 1980–1990. The Colvin Award was established in 1994 from the proceeds of an endowment set up by Lloyd Colvin that named the ARRL as a beneficiary. The Award disburses grants to support ham radio projects that promote international goodwill in the field of DX. Among others, the Colvin Award helped to fund the second World Radiosport Team Championship in 1996 and the VKØIR Heard Island DXpedition in 1997."

Lloyd and Iris were able to take annual six-month DXpeditions because of their success as real estate brokers and general contractors, especially in the San Francisco Bay area. Iris built apartment buildings and hospitals in California and houses in Alaska and North Carolina.

Spratly Report

The following is via G3XTT: "The 9MØC operation closed down on Tuesday, February 24th, after making well over 65k QSOs with over 180 DXCC countries. The DXpedition was highly successful in every respect with all goals being achieved. Full write-ups will appear in a number of the key magazines, including *CQ Ham Radio* (Japan), *Radio Communication* (UK), *Funk* (Germany), etc. 9MØC presentations are scheduled for Visalia, Dayton, Friedrichshafen, the RSGB HF Convention, the Clipperton DX Club Convention, VERON (Netherlands), and elsewhere.

"We were able to run four high-power (400 watt) stations around the clock, each consisting of an FT-1000MP and VL-1000, a combination which worked flawlessly. Two further low-power (100 watt) operating positions using FT-920s enabled us to be on two additional bands at key times. One of these 920s was also used for 6 meter work when that band was open. Dunestar filters reduced inter-station interference to negligible levels. With only minor hiccoughs, we were also able to backup our logs in real-time to a central server, and to upload them daily to the Internet via a satellite link (the operating positions were linked by a 'wireless-LAN' based on Timewave/AEA TNCs, and software developed for the DXpedition by G3WGV). The Internet log servers have already recorded well over 20,000 hits.

"All antennas worked as expected, and several times we managed to operate SSB simultaneously with CW or RTTY on either 20 or 15 meters. Cushcraft anten-

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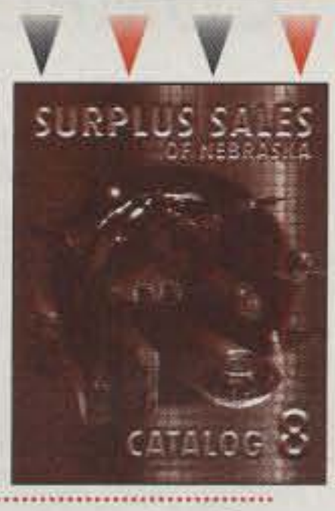

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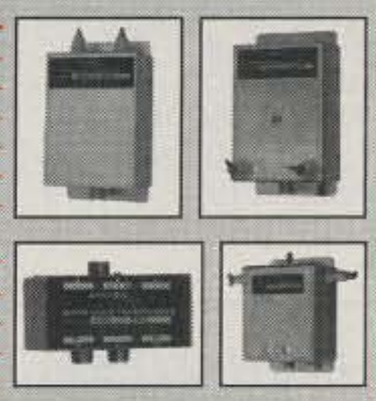

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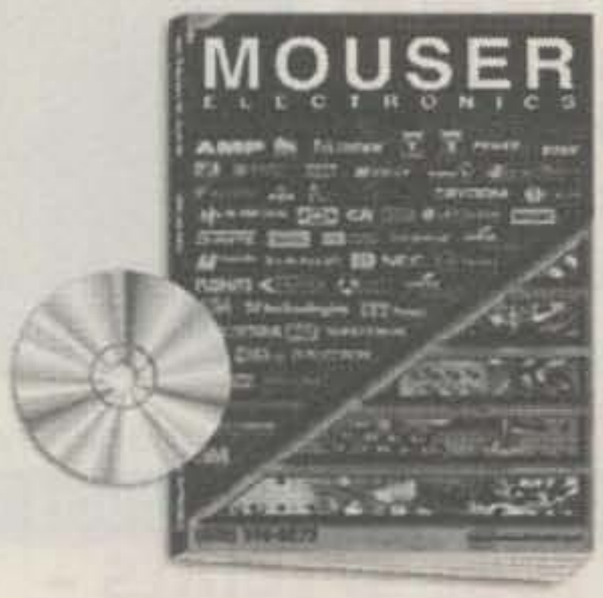

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Mome, Z32ZM, is very active on CW. (Thanks to Z32KV for the photo)

The WPX Program

SSB

2663.....RAØFU 2665.....EA2BP
2664.....G4BWP

CW

2976.....RAØFU 2978.....G4BWP
2977.....JH4JNG

Mixed

1800.....RAØFU 1802.....G4BWP
1801.....SM5DAC

Award of Excellence: OE6CLD
160 meter Bar: OE6CLD

CW: 350 JH4JNG, G4BWP, 4XØ/G3WQU. 400 JH4JNG, G4BWP, 4XØ/G3WQU. 450 JH4JNG, G4BWP. 500 JH4JNG, G4BWP. 550 JH4JNG. 600 JN4JNG. 650 JH4JNG. 700 JH4JNG. 750 JH4JNG. 800 JH4JNG. 850 JH4JNG. 900 JH4JNG, EA2BNU. 950 JH4JNG, EA2BNU. 1000 DF6SW, JH4JNG. 1050 DF6SW, JH4JNG. 1100 DF6SW, JH4JNG. 1150 LU3DSI, JH4JNG. 1200 LU3DSI, JH4JNG. 1750 S51NR.

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Mixed: 450 SM5DAC, G4BWP. 500 SM5DAC, G4BWP. 550 SM5DAC, G4BWP. 600 SM5DAC, JA2-3803, G4BWP. 650 SM5DAC, JA2-3803, G4BWP. 700 G4BWP. 750 SM5DAC, G4BWP. 800 SM5DAC, G4BWP. 850 SM5DAC, G4BWP. 900 SM5DAC, ON4CAS, G4BWP. 950 SM5DAC, G4BWP, EA2BNU. 1000 SM5DAC, G4BWP, EA2BNU. 1050 SM5DAC, G4BWP, EA2BNU. 1100 SM5DAC. 1150 .SM5DAC. 1200 SM5DAC. 1250 WA3GN2, SM5DAC. 1300 SM5DAC. 1350 SM5DAC. 1400 SM5DAC. 1450 SM5DAC. 1500 SM5DAC. 2700 I2EOW. 2750 I2EOW. 2800 KS3F, I2EOW. 2850 I2EOW.
4250 W2FXA.

10 meters: G4BWP
15 meters: G4BWP
20 meters: G4BWP
40 meters: JA2-3803, G4BWP
80 meters: G4BWP
160 meters: G4BWP

Asia: DL3NEO, WA3GNW, G4BWP
Africa: G4BWP

No. America: G4BWP
So. America: G4BWP
Europe: JA2-3803, G4BWP
Oceania: G4BWP

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Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, K9BG, W1BWS, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ, VR2UW, DJ3JSW, OE6CLD, HB9BIN.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

Frank Murdzia, 7J6AAK/2, operated as VK9EKY from Lord Howe Island in January.

nas were used on the HF bands (10, 12, 17, 15, 20, 30) plus 6 meters, mostly at 30 ft., although we did manage to erect the 20-3CD 20 meter monobander at 40 ft., with great results (all were at the water's edge). On 40 and 80 we used four-square arrays based on Gladiator verticals, and switching/phasing boxes from Vine Antennas of the UK. The 40 meter array in particular worked extremely well, and 40 quickly became our preferred band for working over the toughest propagation path into the eastern U.S. The Titanex vertical was used mainly on 160, with great results on transmit, although we constantly had to battle static from tropical storms on receive. The Battle Creek Special gave us a backup antenna for 80, allowing us to work both SSB and CW simultaneously at times. On 30 we also used a pair of phased verticals (one-eighth wave apart) based on modified CB whips. This was very much an experiment, but proved to be highly successful.

"We have been particularly pleased to receive feedback from many people who worked us with low power and modest antennas, often on several bands. Equally, there were many well-equipped stations who worked us on every available band/mode slot. We'll do some further analysis of the logs in due course, to bring out this sort of data by country.

"The overall QSO total places 9MØC in fourth position after VKØIR, 4J1FS, and ZA1A, which along with our achievements on 160, RTTY, etc., we consider a good outcome for our first attempt at a major DXpedition. Our thanks to all our sponsors, details of whom have appeared in previous information bulletins and on our Web page <http://members.aol.com/spratly98>. Without their help our plans would have had to be considerably less ambitious. The Web page also features some photographs taken by digital camera and uploaded while we were still on the island.

"QSLs cards will be printed at the earliest opportunity. A reminder that the QSL manager is Phil Whitchurch, G3SWH, 21 Dickensons Grove, Conresbury, Bristol,

CQ DX Awards Program

SSB

2242	F5SOF	2243	DL8CM

CW

970	SP3FZN

SSB Endorsements

320	DL8CM/328	310	N4HK/319
320	KZ2P/328	310	EA1JG/317
320	KØKG/328	310	W4WX/311
320	VK4LC/328	150	F5SOF/170

CW Endorsements

320	F3AT/328	300	KE5PO/304
320	WB5MTV/324	275	LU3DSI/292
300	I2EOW/307	200	EA2BNU/200

RTTY Endorsements

250	KE5PO/274

Total number of active countries is 328. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

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CW

K2TQC 328	W4QB 328	9A2AA 326	K8NA 325	KUØS 323	K6CU 319	WB4DBB 312	CT1YH 305	G4MVA 294
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WB4UBD 310	K3UA 288	YC2OK 281	KE5PO 274	I1JQJ 273	G4BWP 267

BS19 5HQ, England. Cards can also be sent via the bureau, or requested by e-mail <phil@g3swh.demon.co.uk>." *(Our thanks to Don Field, G3XTT, for the preceding info.)*

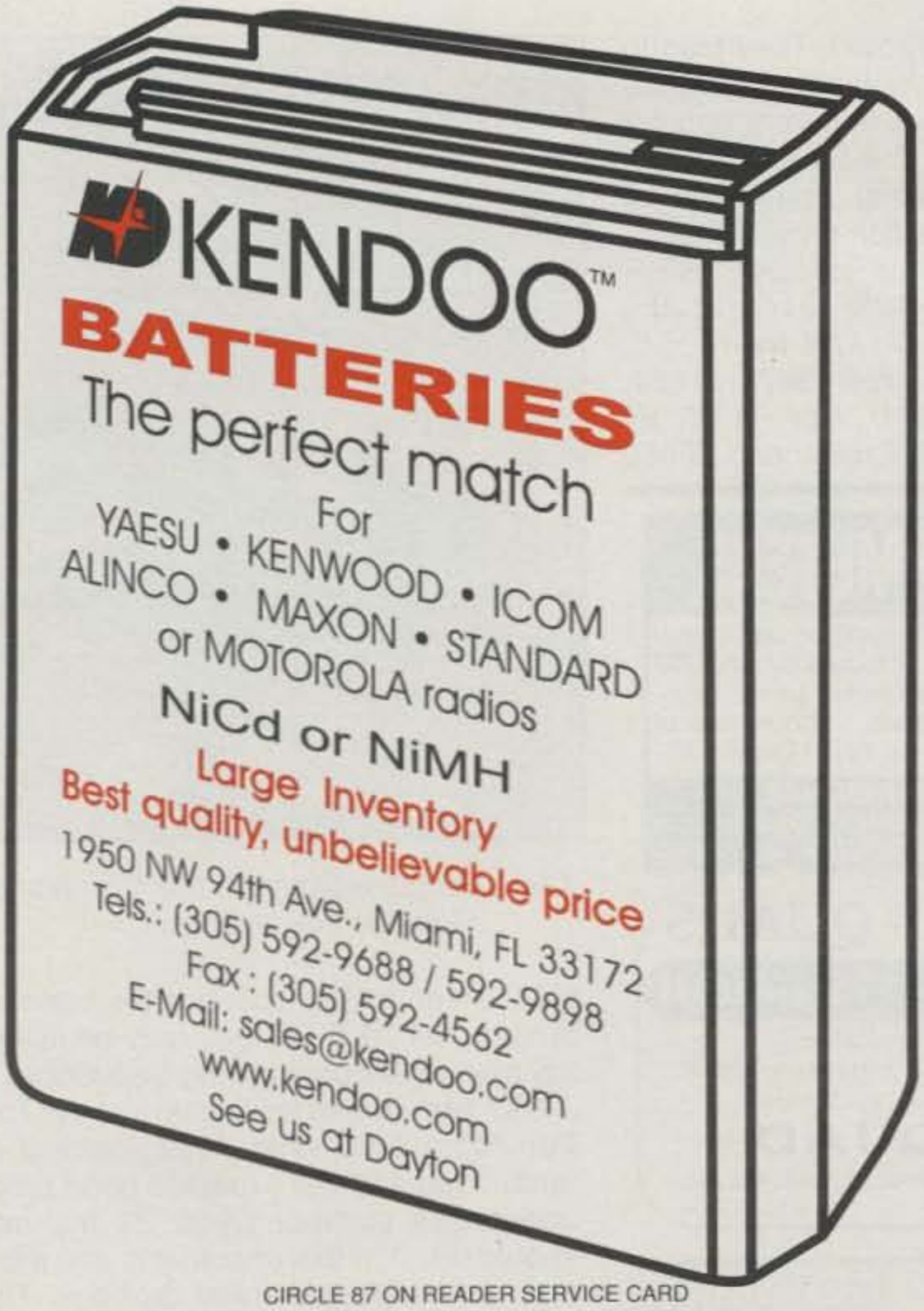
DX News

CQ DX Hall of Famer Franz Langer, DJ9ZB, has published a new edition of his *DX World Guide* in 1998. The 354-page book includes maps, QSL bureaus, prefix information, grid squares, and more. Each DXCC country is featured on a separate page, with licensing information, photos, QSL cards from past operations, and more. Price is 40 DM or US$25, including airmail postage, from Joe Kraft, DL8HCZ, Gruetzmuehlenweg 23, Hamburg D-22339, Germany. E-mail address is <funk-telegramm@t-online.de>.

The Daily DX reports on DXAC news: "John Kanode, N4MM, reports that the ARRL DXAC and Awards committee has voted to delete Southern Sudan, ST0. Kanode said, 'This will be the last of the deleted countries. When the new DXCC-2000 rules go into effect on March 31, 1998, the deleted country concept goes away.' With this deletion there will be 58 deleted countries and 328 current ones. When asked about the deletion date Kanode said, 'The date mentioned was 1/1/95.' The ARRL Membership Services Committee will be meeting on March 28th in Texas and should be announcing the full details about this deletion."

Upcoming DX Activity

The big DX news this month is a major DXpedition to St. Brandon archipelago 3B7. A multi-national team plans to have several stations operating simultaneous-



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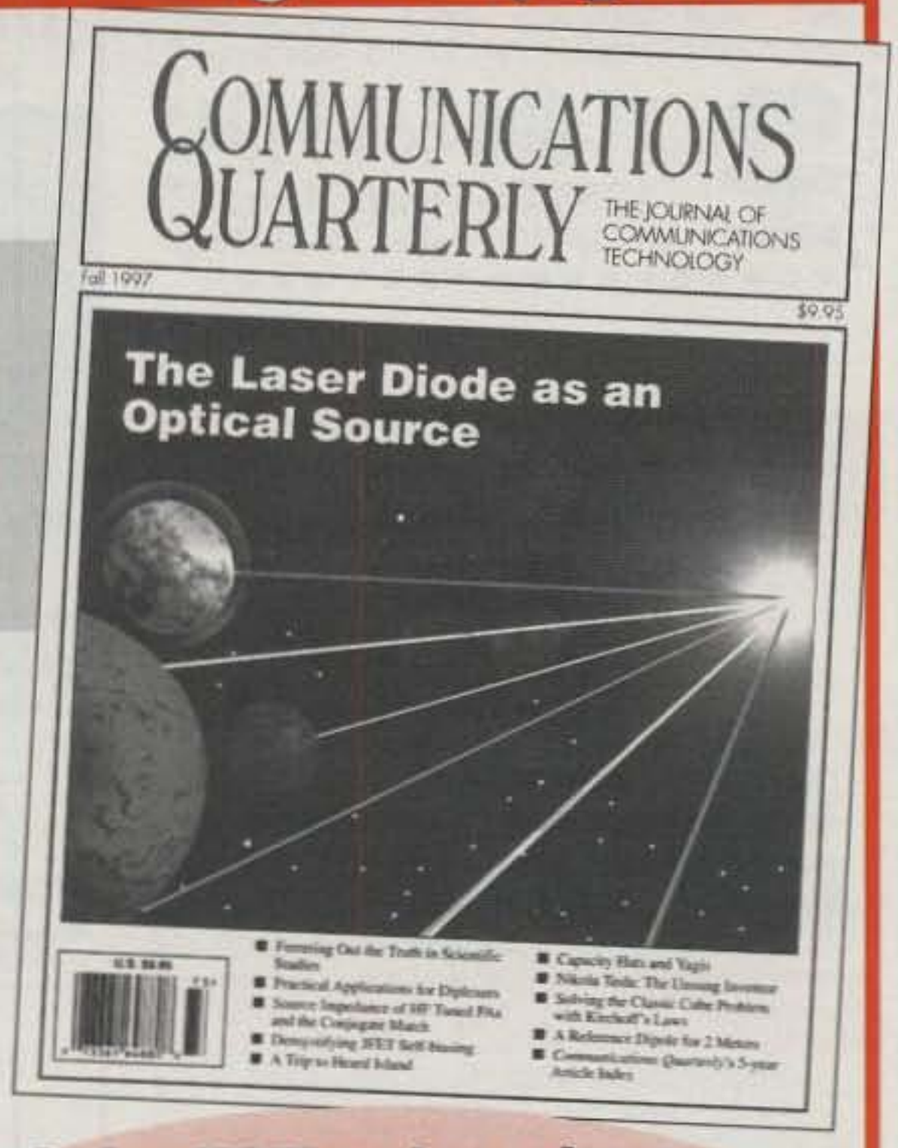

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ly from the rare location. Operators are 3B8CF, 4X1DF/A, HB9ABO, HB9ADP, HB9AFH, HB9AFI, HB9AHL, HB9AJW, HB9BQI, HB9BQW, HB9BXE, HB9JAI, and K5KG. The group expects to land on St. Brandon (AF-015) around May 5 and operate until May 17, departing the next day. They will have four full-power stations and operate on CW, SSB, RTTY, and SSTV. Although no callsign has yet been issued, the group has written assurances from the Mauritian authorities that the license will be granted. They plan to upload their logs daily via the Inmarsat system, for quick review, a very popular feature with DXers. The Swiss have set up a very nice-looking homepage at <http://www.3b7-brandon.ch/>. Suggested frequencies are as follows: SSB—1842, 3799, 7065, 14195, 18145, 21295, 24945, and 28475. On CW try 1826.5, 3507, 7007, 10104, 14024, 18074, 21024, 24894, and 28024 kHz. For RTTY, try 7035, 14080, 18105, 21080, and 28080 kHz. Listen to the operator for listening ranges. On 75 SSB, they may be listening *below* their transmitting frequency.

3B7 has worked its way up into the Top Ten Most Wanted in 1997, coming in tenth. That and the expected good propagation as sunspot Cycle 23 matures should result in lots of contacts and a big drop in the Most Wanted rankings. The group seeks contributions. Contact Josef Meier HB9AJW at <100450.540@compuserve.com> for information on making a contribution.

In other news, Claus, ST1AP (ex-9N1AP), plans to operate from the South Sudan as **ST0AP** until September. He will most often be found in the German net on 14332 kHz at 0745Z. QSL via DJ6SI. (But see note above about South Sudan.)

9N1CU is Henning, OZ2CU, on a two-year assignment in Nepal.

Two DXers will be operating the CQ WPX CW Contest from Antigua. Jim, K5TT (ex-WV5S), expects to operate as **V26TT**, and W5AO (ex-N5CG) will be on as **V26GG** May 26-June 2. QSL V26TT via K5TT and V26GG via P.O. Box 88, Morris, OK 74445.

Don't forget to make plans to attend the seventh New Orleans International DX Convention at the Royal Sonesta Hotel August 14–15. My wife and I will be there.

Thanks to *The Daily DX* for these news tips. Contact Bernie McClenny, W3UR (ex-WR3E, WB3JRU), Editor of *The Daily DX*, <http://www.wdn.com/thedailydx> or <bernie.mcclenny@mail.wdn.com> for more info about this valuable DX tool.

You will note that there are no 5-Band WAZ and regular WAZ charts this month. K1MEM needed a break this time, but he will be back with the updated programs next month. QSL info will be back, too.

73, Chod, VP2ML

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BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

FCC to Adopt New Amateur Rule Amendments, Procedures, and Systems

The FCC has under consideration two major proceedings that are sure to bring new privileges to licensed amateur operators. Both have been under consideration for some time, and the FCC is just about ready to release them. Keep in mind that an NPRM is just that—a proposal. Once the public has had a chance to comment on them, the final rules could be somewhat different.

In addition, the FCC is in the process of implementing their new Universal Licensing System and is looking to further privatize the Amateur Service.

International Amateur Radio Operating

The first is a Notice of Proposed Rulemaking (NPRM) that was issued in the fall of 1996. WT Docket 96-188 looks toward "Authorization of Visiting Foreign Amateur Operators to Operate Stations in the United States." There are two pending bilateral operating agreements that will provide convenient ways for foreign and U.S. amateur operators to operate their stations in countries other than their own.

Currently, foreign amateur operators are authorized to operate stations in the U.S. under three circumstances:

1. U.S. operating privileges are granted to citizens of Canada who hold amateur service licenses issued by the Government of Canada;

2. Citizens of some 76 countries, the governments of which have entered into bilateral reciprocal operating arrangements with the U.S., may obtain non-renewable one-year permits to operate their amateur stations in the U.S.; and

3. Non-U.S. citizens who pass the required examinations are granted licenses in the same manner as U.S. citizens. This latter method is generally used by foreign operators who reside permanently in the U.S. or who are here for lengthy stays.

There are two pending international reciprocal operating arrangements that offer to provide more convenient ways for foreign amateur operators to operate stations in the U.S.: the European Conference of Postal and Telecommunications Administrations (CEPT) radio-amateur license and the Inter-American Convention on an International Amateur Radio Permit (CITEL/Amateur Convention). Our FCC has proposed an amendment to the Part 97 Rules that would authorize citizens of certain countries in Europe and the Americas to operate stations while on short visits to the United States by implementing these two international reciprocal operating arrangements.

The rule change is necessary so that U.S. amateur operators can also operate in 22 European countries, eight South American countries, Mexico, and Honduras, and so that operators from those countries can operate their amateur stations in places where the amateur service is regulated by the Commission.

The effect of the action will be to provide a convenient procedure for foreign and U.S. tourists, conference attendees, students, and professors who are licensed amateur operators to operate their amateur stations while on short visits outside of their country. With the United States as a participating non-CEPT country, citizens of our country could operate amateur stations temporarily in participating European countries, and their citizens could enjoy similar operating privileges in the United States.

The CITEL/Amateur Convention is an arrangement for countries in the Americas. Under the CITEL/Amateur Convention, individual amateur operators with an International Amateur Radio Permit (IARP) would have reciprocal operating privileges in each other's countries. The American Radio Relay League, Inc. (ARRL) has offered its services to the Department of State to issue IARPs on a non-discriminatory basis, at no cost, charge, or expense to the United States Government.

There are two classes of CEPT radio-amateur licenses and IARPs. Class 1 requires knowledge of the international Morse code and carries all operating privileges and is similar to the Amateur Extra Class. Class 2 does not require knowledge of telegraphy and carries all operating privileges above 30 MHz and is similar to the Technician Class operator license. The FCC has proposed to authorize for Class 1 operators the frequency privileges of amateur Extra Class operators, and for Class 2 operators the frequency privileges of the Technician Class.

The FCC said "Under a CEPT radio-amateur license or an IARP, we do not anticipate that sophisticated station operations, such as beacon, repeater, or auxiliary station operations, would be attempted. In addition, our rules do not permit these two new categories of licensees/permittees to engage in such sophisticated operations."

New Proposed Part 97 Rules

What follows are the new FCC rule amendments concerning the CEPT and IARP licenses that are *proposed* to be added to Part 97. New definitions would be added to Part 97, Sec. 3 as follows:

CEPT radio-amateur license. A license issued by a country belonging to the European Conference of Postal and Telecommunications Administrations (CEPT) that has adopted Recommendation T/R 61-01 (Nice 1985, revised in Paris 1992 and by correspondence August 1992).

IARP. International Amateur Radio Permit. A document issued pursuant to the terms of the Inter-American Convention on an International Amateur Radio Permit by a country signatory to that Convention, other than the United States. (Montrouis, Haiti. AG/doc.3216/95.)

New paragraphs would be added to Section 97.5 and Section 97.7 as follows:

Sec. 97.5 Station license required.

Sec. 97.7 Control operator required.

(c) A CEPT radio-amateur license or IARP issued to the person by the country of which the person is a citizen. The person must not:

(i) Be a resident alien or citizen of the United States, regardless of any other citizenship also held;

(ii) Hold an FCC-issued amateur operator license nor reciprocal permit for alien amateur licensee;

(iii) Be a prior amateur service licensee whose FCC-issued license was revoked, suspended for less than the balance of the license term and the suspension is still in effect, suspended for the balance of the license term and relicensing has not taken place, or surrendered for cancellation following notice of revocation, suspension, or monetary forfeiture proceedings; or

(iv) Be the subject of a cease and desist

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order that relates to amateur service operation and which is still in effect.

In Sec. 97.107, paragraph (c) would be revised and new paragraphs (d) and (e) added to read as follows:

Sec. 97.107 Alien control operator privileges.

(c&d) The privileges available to a control operator holding a valid CEPT radio-amateur license or IARP are as specified in sections §97.207, §97.209, §97.211, §97.213, §97.215, §97.219, and §97.221 of subpart C of this part, and in Section §97.301 of Subpart D of this part, provided the holder:

(1) Complies with the terms of the agreement between the CEPT and the United States or of the Inter-American Convention on an International Amateur Radio Permit (AG/doc.3216/95);

(2) Is not a resident alien or citizen of the United States;

(3) Has not been in any area where radio services are regulated by the FCC for more than 180 days within the immediately preceding five years;

(4) Does not hold an FCC-issued operator/primary station license grant; and

(5) Does not hold an FCC-issued reciprocal permit.

(e) At any time the FCC may, in its discretion, modify, suspend, or cancel the reciprocal permit for alien amateur licensee, or the amateur service privileges of any Canadian amateur service licensee, CEPT radio-amateur licensee, or IARP permittee within or over any area where radio services are regulated by the FCC.

In Sec. 97.119, paragraph (f) explains how a station operating under a CEPT or IARP license should identify his/her station:

Sec. 97.107 Station identification.

(f) When the station is transmitting under the authority of a reciprocal permit for alien amateur licensee, a CEPT radio-amateur license, or an IARP, an indicator consisting of the appropriate letter-numeral designating the station location must be included before, after, or both before and after, the call sign issued to the station by the licensing country. When the station is transmitting under the authority of an amateur service license issued by the Government of Canada, the station location indicator must be included after or both before and after the call sign. At least once during each intercommunication, the identification announcement must include the geographical location as nearly as possible by city and state, commonwealth, or possession.

In Sec. 97.301, the introductory texts of paragraphs (a) and (b) are expected to be revised to read as follows. They indicate the frequency privileges accorded to foreign CEPT and IARP operators when operating in the U.S.

Sec. 97.301 Authorized frequency bands.

(a) For a station having a control operator who has been granted a Technician, Technician Plus, General, Advanced, or Amateur Extra Class operator license or who holds a CEPT radio-amateur license or IARP of any class *[has full privileges above 30 MHz]*.

(b) For a station having a control operator who has been granted an Amateur Extra Class operator license or who holds a CEPT radio-amateur license Class 1 license or Class 1 IARP [has all amateur radio frequency privileges].

Additional Spread Spectrum Codes To Be Authorized

In the spring of last year the FCC proposed in WT Docket No. 97-12 to "Provide for the Greater Use of Spread Spectrum Communication Technologies in the Amateur Radio Services."

This Notice of Proposed Rulemaking (NPRM) seeks to allow amateur stations to transmit spread spectrum (SS) emission technologies that employ additional spreading sequences. It also proposes that each SS transmitter be required to automatically limit its power to that actually necessary to carry out the communications when the transmitter power exceeds 1 watt.

This action is in response to a 1995 petition for rule making from the American Radio Relay League, Inc. The ARRL asked the FCC to amend the rules to allow amateur stations to transmit spread spectrum type emission using additional spreading sequences. It also requested that each SS transmitter be required to incorporate a device to automatically limit its power to that actually necessary to carry out the communications.

The ARRL believes these rule changes will allow the amateur service to contribute to the development of SS communications. The FCC agreed and said such a rule change was " . . . consistent with their general policy of allowing licensees flexibility to develop more effective and efficient uses of the radio spectrum."

Spread spectrum is a technique whereby little pieces of the transmitted signal are distributed over a wide segment of spectrum and reassembled according to a formula. The signal power density is typically very low, and the duration of a transmission on any frequency in the segment of the spectrum can be but a fraction of a second. SS systems have the unique capacity to share spectrum despite a number of stations already transmitting in the band.

Two types of spreading techniques, frequency hopping and direct sequence, are currently authorized on amateur service frequencies above 420 MHz with transmitter powers up to 100 watts. Experiments conducted by amateur operators over sev-

eral years have shown that stations transmitting SS emissions can co-exist with other amateur stations, and in many cases these spread spectrum emissions are totally undetectable by other amateur stations operating on the same frequency.

As requested by the ARRL and Part 15 equipment providers, the FCC is requiring that power control circuitry be employed which automatically reduces the radiated power of an amateur station transmitting an SS emission to the minimum level necessary to conduct communications. The FCC also asked for suggested methods that could be used to minimize any potential interference between amateur station operations and Part 15 devices.

The FCC proposed to eliminate the rules that restricted amateur stations to transmitting only frequency hopping and direct sequencing spreading techniques. Spread spectrum emission transmissions must not be used to make communication secret nor may a station transmitting SS emissions cause harmful interference to stations employing other authorized emissions.

The FCC said the intent of the NPRM was to compile a record in sufficient detail for the FCC to determine whether they should authorize amateur stations to use additional spread spectrum type emission technologies and whether such use would facilitate the ability of the amateur service to contribute to the development of SS communications.

New Proposed Part 97 Rules

Following are the new *proposed* FCC rule amendments concerning new SS spreading techniques that are to be added to Part 97. New definitions would be added to Part 97, Sec. 3 as follows:

SS: Spread-spectrum emissions using bandwidth-expansion modulation emissions having designators with A, C, D, F, G, H, J, or R as the first symbol; X as the second symbol; X as the third symbol.

Section 97.305(b) would be revised to read as follows:

Sec. 97.305 Authorized emission types.

(b) A station may transmit a test emission on any frequency authorized to the control operator for brief periods for experimental purposes, except no pulse or SS modulation emission may be transmitted on any frequency where pulse or SS emissions are not specifically authorized.

Section 97.311 would be amended by revising paragraphs (a), (b), and (g), and removing and reserving paragraphs (c) and (d) to read as follows:

Sec. 97.311 SS emission types.

(a) SS emission transmissions by an amateur station are authorized only for communications between points within

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areas where the amateur service is regulated by the FCC and between an area where the amateur service is regulated by the FCC and an amateur station in another country that permits such communications. SS emission transmissions must not be used for the purpose of obscuring the meaning of any communication.

(b) A station transmitting SS emissions must not cause harmful interference to stations employing other authorized emissions, and must accept all interference caused by stations employing other authorized emissions.

(g) The transmitter power must not exceed 100 W under any circumstances. If more than 1 W is used, automatic transmitter control shall limit output power to that which is required for the communication. This shall be determined by the use of the ratio, measured at the receiver, of the received energy per user data bit (Eb) to the sum of the received power spectral densities of noise (N<INF>0) and cochannel interference (I<INF>0). Average transmitter power over 1 W shall be automatically adjusted to maintain an Eb/(N<INF>0+I<INF>0) ratio of no more than 23 dB at the intended receiver.

Amateur Service Licensing To be Further Privatized

The FCC has released a list of 31 proposed initiatives to be explored as part of the 1998 biennial regulatory review. The review is aimed at eliminating or modifying regulations that are overly burdensome or no longer serve the public interest. The Communications Act requires the FCC to review all of its regulations applicable to its licensees in every even-numbered year to determine whether certain rules are no longer necessary.

One of the initiatives listed in the working document released on February 5, 1998 concerns the Amateur Service. The FCC said that it was looking toward streamlining the Part 97 Amateur Radio Service and that it would "Seek comment on amending Parts 0, 1, and 97 of FCC Rules to privatize further the administration of the Amateur Radio Services and to simplify the licensing process."

We asked an official at the FCC's Wireless Telecommunications Bureau (WTB) for further information on this proceeding and were told that any comment at this point would be premature. One then can only speculate on the details of the initiative that applies to the Amateur Service.

Part 0, Title 47 (Telecommunication) of the *Code of Federal Regulations* concerns the "Commission Organization," including the authority delegated to each FCC bureau. Section §0.131 delegates "all matters pertaining to licensing . . . " to the Wireless Telecommunication Bureau. Section §0.483 simply says that all "Application filing procedures for amateur radio operator licenses are set forth in Part 97 . . . " Part 1 covers FCC "Practice and Procedure." Section §1.912 requires all applications requiring a license examination to be submitted to volunteer examiners (VEs). All other applications must be submitted to the FCC in Gettysburg, PA.

The 1998 Biennial Review of FCC Regulations actually began last fall when FCC Chairman William E. Kennard appointed Deputy General Counsel David H. Solomon to coordinate the review with assistance from Senior Managers from each of the FCC's Bureaus and Offices. In announcing early commencement of the 1998 biennial review, Kennard said, "The first biennial review is a key time for the Commission to take a serious top-to-bottom look at its rules."

In a November 18th press release, the FCC said "The Bureau/Office proposals will be presented to the Commission for consideration this winter and next spring, with proposals for final action to be presented to the Commission next summer and fall."

Amateur Service To Be Part of Universal Licensing System

The FCC has recently adopted a NPRM in advance of implementing its Universal Licensing System. The purpose of ULS is to consolidate, revise, and streamline rules governing license application procedures for all radio services licensed by the FCC's Wireless Telecommunications Bureau. ULS is an automated licensing system now in development that will be used to handle all future licensing of wireless radio services. The Amateur Service is one of the radio services included in the program, and it is expected that the new licensing system will go online this coming September.

When fully operational, ULS will replace eleven separate licensing systems and databases now being used for various wireless services with a single system by consolidating all radio service applications and licensing rules. The FCC said the new licensing system would eliminate nearly 200 duplicating and inconsistent rules in various radio services.

A new ULS application form will replace over 40 existing wireless application forms with just five new forms. Thus, all services will use the same set of forms for application information. The existing FCC Form 610 Amateur Radio application form will be replaced with a form revised to incorporate information needed by ULS.

ULS will support full electronic filing of all licensing-related applications in all services and other filings associated with such applications. The VECs will still electronically file Amateur Service new and upgraded license applications, but amateurs (or their agents) will be able to renew and/or modify their own licenses on-line. Also being considered is whether manual filing of applications should be completely abolished. The FCC would like to have all new and license modification documents filed electronically using ULS, as it will greatly reduce the time and expense involved in handling the application.

ULS will also provide the public with on-line access to public licensing data, including that of the Amateur Service. The information will be obtainable by dialing into the FCC's network using any World Wide Web browser.

The Universal Licensing System lets you use a PC to look up, manage, and renew any radio license. You will even be able to pay any applicable fees with a credit card, such as for a new Vanity call sign, by using a password-protected account through a secure Internet connection to the FCC. Amateurs are being asked to populate the ULS database now with their licensing information.

You open your ULS account by registering your TIN (Taxpayer Identification Number) with the FCC. For an individual, the TIN is your social security number. To get set up under ULS, you need to register your current amateur license and call sign using a Web browser on the Internet. More information on Universal Licensing is available at <http://www.fcc.gov/wtb/ uls>.

See you next month.

73, Fred, W5YI

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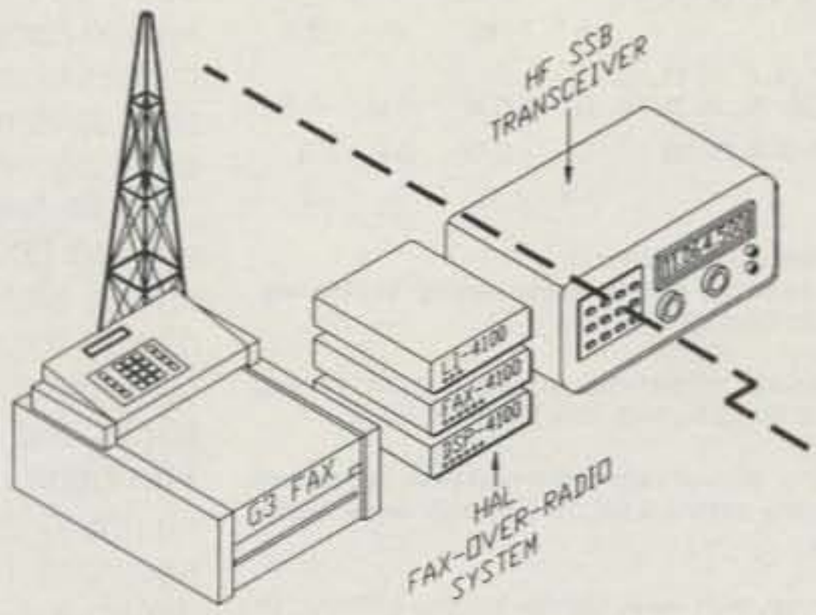

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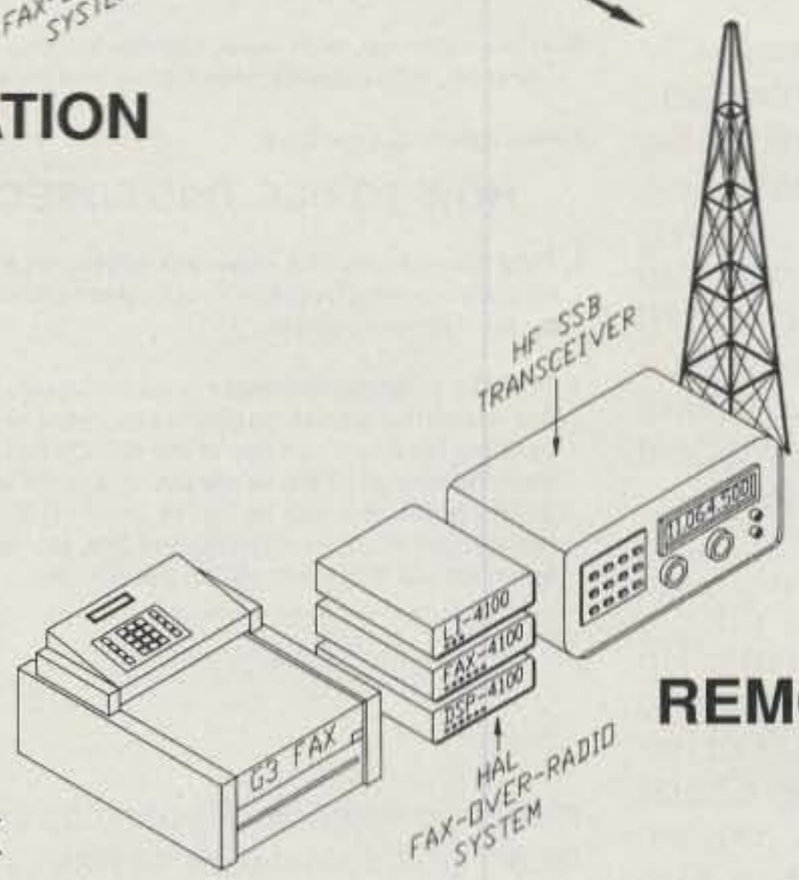

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BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Solar Cycle Progress

According to the Royal Observatory of Belgium, the mean sunspot count for January 1998 was 32.3. A high of 75 was recorded on January 25. The sun was spotless between January 7 and 9. This israther unusual for a new cycle which is beginning to increase at a relatively rapid rate. The January mean level results in a 12-month running smoothed sunspot number of 23 centered on July 1997. This is an increase of 3 from the previous month. The smoothed number is an average of the mean values for the past 12 months, and it is the basis for measuring solar cycle intensity and progress. A smoothed number on the order of 60 is forecast for May 1998.

Solar Flux Values

The Dominion Radio Astrophysical Observatory of Canada, located at Penticton, B.C., reports a mean value of 99 for the January 1998 level of 10.7 cm solar flux. This results in a 12-month running smoothed solar flux level of 82 centered on July 1997. A level on the order of 116 is likely for May 1998. Solar flux levels are directly related to sunspot counts, but are a more accurate and more convenient method for determining solar activity.

May Propagation

The following is a thumb-nail picture of HF amateur band openings expected during May 1998. For specific times of DX openings refer to the DX Propagation Charts which appeared in last month's column. This month's column contains Short-Skip Propagation Charts valid for both May and June, as well as charts centered on Alaska and Hawaii. The Short-Skip Charts contain propagation forecasts for openings varying in distance between 50 and 2300 miles. For day-to-day variations expected in propagation conditions during May see the Last-Minute Forecast, which appears at the beginning of this column.

10 Meters: Some daytime openings, mainly towards southern and tropical areas, should still be possible during May. The best time to check for DX openings should be the afternoon hours. Expect a considerable increase in short-skip openings between distances of approximately 750 and 1400 miles. Some occasional-

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for May 1998

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 6-7, 15-17, 23-2431	A	A	B	C
High Normal: 5, 12, 14, 21, 25	A	B	C	C-D
Low Normal: 1, 4, 8, 10-11, 13 18, 20, 22, 26-29, 31	B	C-B	C-D	D-E
Below Normal: 2-3, 19, 30	C	C-D	D-E	E
Disturbed: 9	C-D	D	E	E

Where expected signal quality is:

A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.

2. With the *propagation index,* use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be fair to good (C-B) on May 1st, fair-to-poor (C-D) on the 2nd and 3rd, fair-to-good (C-B) again on the 4th, good (B) on the 5th, etc.

multi-hop sporadic-*E* openings up to 2800 miles, and sometimes beyond, may also be possible.

12 Meters: Much the same pattern as on 10 meters is expected. Since this is a lower frequency range, the band can be expected to open a bit more often than will 10 meters and stay open for an hour or so longer.

15 Meters: A seasonal decrease in DX openings on this band is normal for May and the summer months, but some fairly good openings to many parts of the world still should be possible during the hours of daylight. The afternoon hours should be best for DX possibilities. Numerous short-skip openings between approximately 600 and 2300 miles should be possible on many days.

17 Meters: The propagation pattern should be similar to 15 meters. With increasing solar activity and summertime propagation conditions in the northern hemisphere, the somewhat lower frequency range of this band may well prove to be a propagation asset. On many days when conditions will not permit 15 meters to open, check this band for openings. When 15 meters does open, expect the same opening on 17 meters, but the band should remain active up to an hour after15 meters closes. When compared to 20 meters, daytime openings may be similar, but often signals will be stronger on 17 meters.

20 Meters: This should be the best all-around DX band during May. Opening shortly after sunrise, good DX conditions can be expected to one area of the world or another through most of the daylight hours, and well into the hours of darkness. The band should remain open for DX to southern and tropical regions well past midnight. Peak conditions are expected during the late afternoon and early evening, when signal levels should be exceptionally strong to most areas of the world. Expect excellent short-skip openings, often with exceptionally strong signal levels, between distances of approximately 350 and 2300 miles. Quite often, particularly during the late afternoon, optimum conditions will exist from both short and long skip, and stations a few hundred miles away will be heard at the same time as DX stations from several thousand miles away, causing considerable QRM.

30 Meters: This can be another propagation asset during summer months. Peak openings are expected during the nighttime hours, much like 40 meters, but often with higher signal levels and somewhat lower noise levels.

40 Meters: Fewer DX openings are expected because of the shorter hours of darkness and the higher levels of static expected in the northern hemisphere during May. However, some good openings to many areas of the world should still be possible from an hour or two before sunset, through the hours of darkness, until an hour or two after sunrise. Good daytime short-skip openings also should be possible for distances ranging between approximately 150 and 750 miles, with nighttime openings extending up to the one-hop limit of 2300 miles.

80 Meters: A considerable decline in DX possibilities is expected during May because of the shorter hours of darkness and seasonal increase in static levels. Some fairly good DX opportunities should continue to occur, however, for openings to many areas of the world during the

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hours of darkness and the sunrise period. Weak signals will often be masked by high static levels. Excellent short-skip openings should be possible during the daylight hours over distances of approximately 50 to 250 miles. During the hours of darkness short-skip openings should increase up to approximately 2300 miles. Short-skip propagation also may often be marred by high static levels.

160 Meters: Nighttime propagation conditions on this band have passed their seasonal peak and should decline until early fall. Openings up to about 1200 miles should be possible regularly during the hours of darkness this month. An occasional opening well beyond this range is likely when static levels are low. No daytime skip openings are expected on this band because of solar absorption.

Sporadic-*E* Propagation

Favorable conditions for VHF ionospheric openings occur much more frequently during May and the summer months in the northern hemisphere, primarily as a result of a summer seasonal increase expected in sporadic-*E* propagation.

Clouds or patches of abnormally intense ionization, which are capable of reflecting radio waves of frequencies much higher than those reflected by the regular *E* or *F* layers, frequently form immediately beneath the normal *E* layer of the ionosphere. These clouds usually cover a rather small geographical area, aproximately 50 to 100 miles in diameter. They occur more or less at random, and are relatively short lived, usually dissipating within a few hours. Since this *sporadic* ionization generally occurs at about the same height as the regular *E* layer, it is called *sporadic-E* ionization, or E_s.

As a result of an intensely ionized sporadic-*E* cloud, it is possible at times to communicate over relatively long distances on the 50 MHz band, and on some occasions on 144 MHz as well (see fig. 1). Further, the effects of sporadic-*E* are often observed on the HF bands.

The height at which sporadic-*E* usually occurs limits one-hop propagation to a maximum distance of approximately 1300 miles. For this reason, band openings due to E_s, whether on HF or VHF, are generally referred to as "short-skip" openings. During periods of geographically widespread sporadic-*E* ionization, which often happens during the summer months, multi-hop propagation is sometimes possible. Trans-atlantic sporadic-*E* openings on 10 and 15 meters, consisting of at least three hops, have been reported, as well as 50 MHz openings over two-hop distances up to 2600 miles.

Sporadic-*E* ionization has long been the object of scientific investigation by amateur operators and research scientists.

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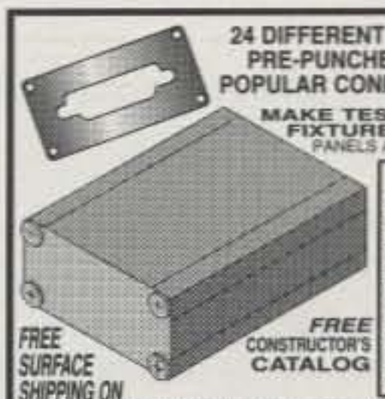

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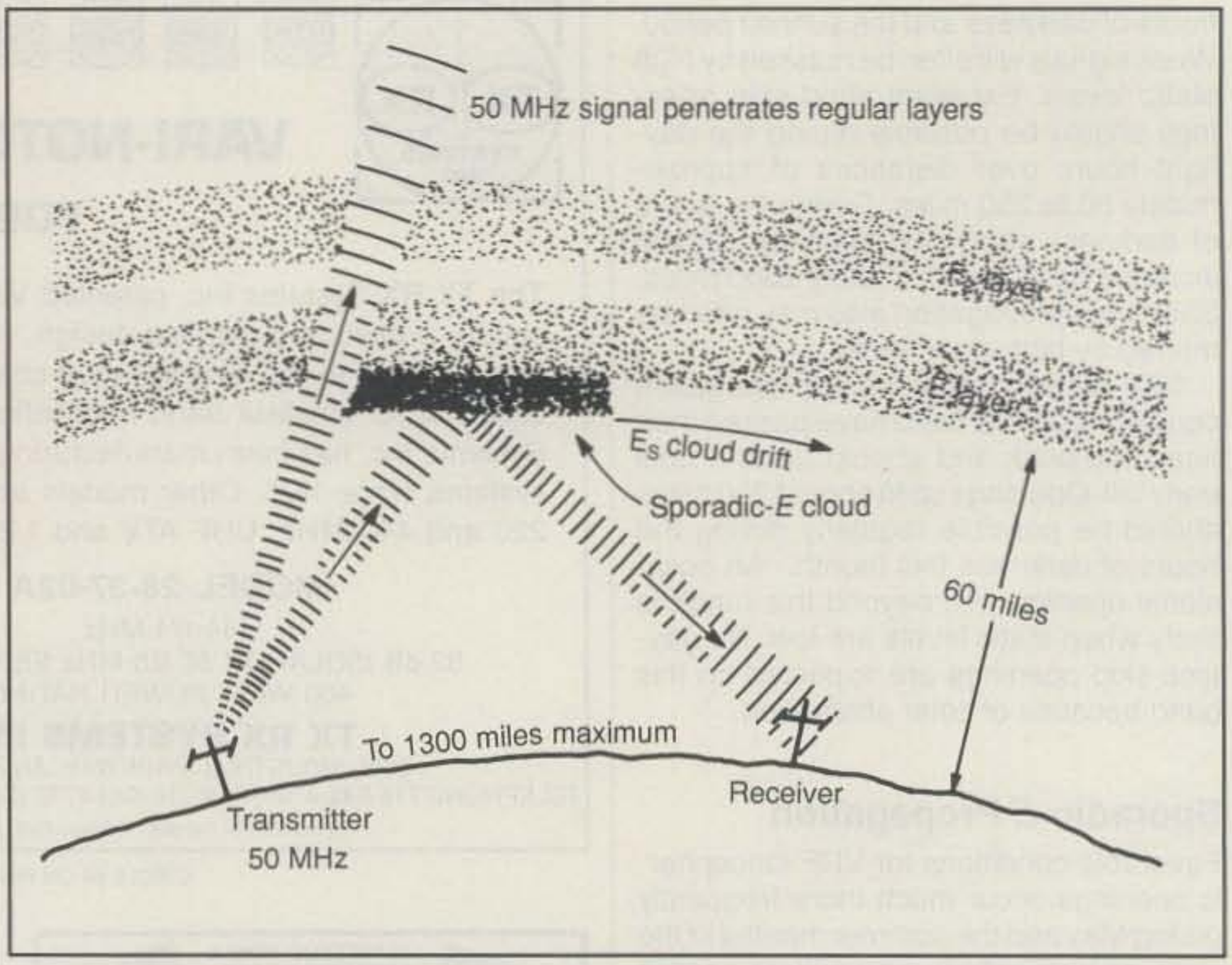

Fig. 1– Fifty MHz short-skip propagation by means of sporadic-E reflection.

Studies have shown, for example, that in the mid-latitudes (United States, Europe, etc.) the diurnal variations in sporadic-*E* occurrence have a tendency to peak during the late morning hours and again around sunset, although E_s can occur at any time. More specifically, during the summer months peaks in sporadic-*E* activity are observed between 10 AM and noon local time and again from 6 to 8 PM. Thus, sporadic-*E* propagation is primarily a daytime phenomenon during the summer months, decreasing rapidly after local sundown.

Nearly 80% of all E_s propagation observed in North America and Europe takes place from May through August, with a maximum occurring in June. In the temperate zone of the southern hemisphere similar patterns have been observed during the months of November to February, which corresponds to the summer season in that area. A secondary maximum is evident in the month of December, with a definite minimum occurring in March.

Here is a useful tip for predicting 50 MHz *short-skip* E_s openings. The geometry of propagation is such that as the skip distance *decreases* on the 21 and 28 MHz bands, the highest frequency that will be reflected by a sporadic-*E* cloud *increases*. By observing the *minimum* ionospheric skip distance heard on 21 or 28 MHz during an E_s opening, and using he chart shown in fig. 2, it should be possible to tell whether 50 MHz is open, and what the skip distance might be.

To demonstrate how this technique works, consider the following example. Suppose the minimum skip distance observed on 28 MHz in a southwesterly direction is 400 miles (it is the distance to the nearest skip station heard that is important). From fig. 2 the intersection between 400 miles and the 28 MHz curve

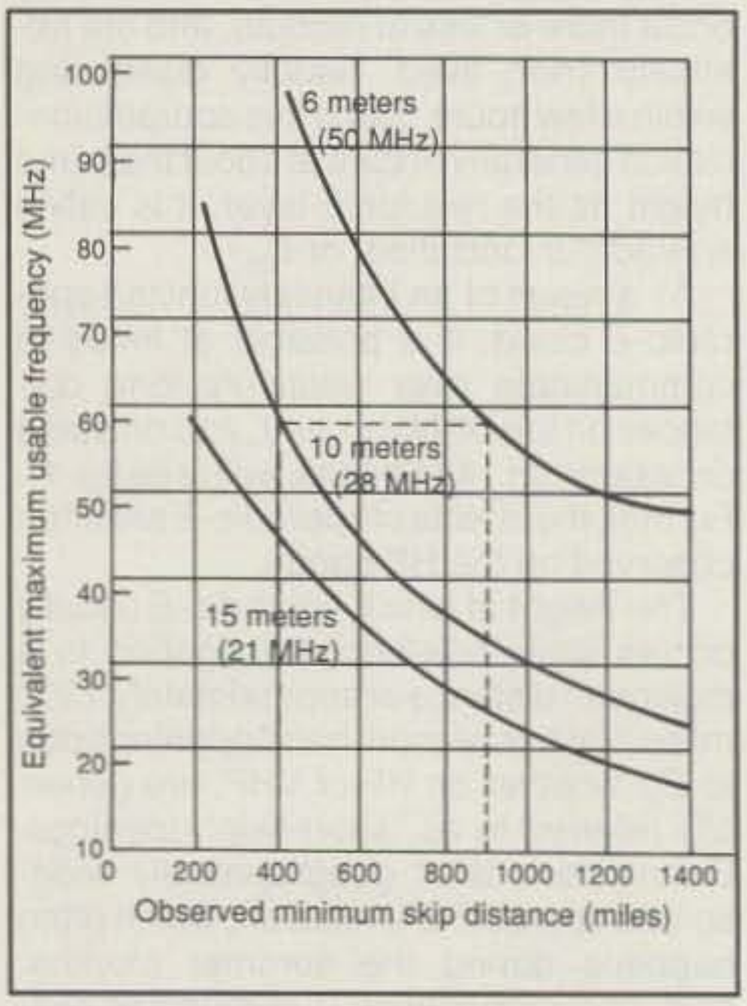

Fig. 2– Chart describing correlation between sporadic-E openings on the 10 and 15 meter amateur bands and possible 6 meter openings at the same time. The example shows a minimum skip distance of 400 miles observed on 10 meters; from the chart, 6 meters should be open with skip distance of greater than 900 miles.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. In the Short-Skip Chart appropriate *standard* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Chart
May & June 1998
Local Daylight Savings Time
At Path Midpoint

Band		*Distance Between Stations (miles)*		
(meters)	*50-250*	*250-750*	*750-1300*	*1300-2300*
10	Nil	08-10 (0-1)	08-10 (1)	08-10 (1-0)
		10-14 (0-2)	10-14 (2)	10-22 (2-0)
		14-18 (0-1)	14-18 (1-2)	22-23 (1-0)
		18-22 (0-2)	18-22 (2)	23-08 (1-0)
		22-00 (0-1)	22-00 (1)	
			00-08 (0-1)	
15	Nil	07-10 (0-1)	07-10 (1-2)	07-10 (2-0)
		10-14 (0-2)	10-14 (2-3)	10-17 (3-1)
		14-18 (0-1)	14-18 (1-3)	17-20 (3-2)
		18-22 (0-2)	18-20 (2-3)	20-22 (2-1)
		22-01 (0-1)	20-22 (2)	22-23 (1)
			22-01 (1)	23-07 (1-0)
20	10-21 (0-1)	07-10 (0-2)	07-08 (2)	07-08 (2)
		10-13 (1-3)	08-10 (2-3)	08-10 (3-2)
		13-18 (1-4)	10-13 (3-4)	10-16 (4-3)
		18-20 (1-3)	13-18 (4)	16-21 (4)
		20-21 (1-2)	18-20 (3-4)	21-23 (3)
		21-23 (0-2)	20-21 (2-4)	23-01 (2)
		23-07 (0-1)	21-23 (2-3)	01-07 (1)
			23-01 (1-2)	
			01-07 (1)	
40	08-10 (1-2)	08-10 (2-4)	08-09 (4-3)	08-09 (3-1)
	10-12 (2-4)	10-15 (4-2)	09-10 (4-2)	09-10 (2-1)
	12-18 (3-4)	15-16 (4-3)	10-15 (2-1)	10-16 (1-0)
	18-20 (2-4)	16-20 (4)	15-16 (3-1)	16-19 (2-1)
	20-22 (1-3)	20-22 (3-4)	16-19 (4-2)	19-22 (4-3)
	22-00 (0-2)	22-00 (2-3)	19-22 (4)	22-03 (4)
		00-08 (0-1)	00-08 (1-2)	22-00 (3-4)
				00-03 (2-4)
				03-05 (2-3)
				05-08 (2)
80	08-11 (4)	08-10 (4-1)	08-09 (1)	08-09 (1-0)
	11-19 (4-3)	11-16 (3-0)	09-10 (1-0)	09-18 (0)
	19-22 (4)	16-18 (3-1)	10-16 (0)	18-20 (1-0)
	22-00 (3-4)	18-19 (3-2)	16-18 (1-0)	20-21 (3-1)
	00-06 (2-3)	19-20 (4-2)	18-20 (2-1)	21-23 (3-2)
	06-08 (3-4)	20-00 (4)	20-23 (4-3)	23-03 (4-3)
		00-06 (3-4)	23-03 (4)	03-06 (3-2)
		06-08 (4-3)	03-06 (4-3)	06-08 (2-1)
		10-11 (4-0)	06-08 (3-2)	
160	06-09 (4-1)	06-09 (1)	08-09 (1)	08-21 (0)
	09-10 (2-0)	09-19 (0)	09-21 (0)	21-01 (1)
	10-19 (1-0)	19-21 (1-0)	21-23 (1)	01-04 (2)
	19-21 (3-1)	21-23 (2-1)	23-01 (2-1)	04-06 (2-1)
	21-23 (4-2)	23-01 (3-2)	01-04 (3-2)	06-07 (1)
	23-06 (4-3)	01-04 (3)	04-07 (2)	07-08 (1-0)
		04-06 (3-2)	07-08 (1)	

ALASKA
May & June 1988
Openings Given in GMT#

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Eastern USA	Nil	20-02 (1)	22-00 (1)	Nil
			00-02 (2)	
			02-04 (3)	
			04-05 (2)	
			05-06 (1)	
			10-12 (1)	
			12-14 (2)	
			14-16 (1)	
Central USA	Nil	21-04 (1)	22-02 (1)	08-12 (1)
			02-03 (2)	
			03-05 (3)	
			05-06 (2)	
			06-07 (1)	
			12-13 (1)	
			13-15 (2)	
			15-16 (1)	
Western USA	Nil	20-23 (1)	00-02 (2)	07-09 (1)
		01-03 (1)	02-04 (3)	09-14 (2)
		03-05 (2)	04-07 (4)	14-15 (1)
		05-06 (1)	07-08 (3)	11-13 (1)*
			08-09 (2)	
			09-15 (1)	
			15-18 (2)	
			18-00 (1)	

HAWAII
May & June 1998
Openings Given in Hawaiian Standard Time#

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	Nil	12-15 (1)	13-15 (1)	19-20 (1)
		15-17 (2)	15-17 (2)	20-23 (2)
		17-19 (1)	17-19 (3)	23-02 (1)
			19-20 (2)	21-23 (1)*
			20-04 (2)	
			04-08 (1)	
Central USA	Nil	12-15 (1)	15-16 (2)	19-20 (1)
		15-18 (2)	16-17 (3)	20-21 (2)
		18-20 (1)	17-19 (4)	21-01 (3)
			19-20 (3)	01-02 (2)
			20-22 (2)	02-04 (1)
			22-04 (1)	20-21 (1)*
			04-05 (2)	21-00 (2)*
			05-07 (3)	00-03 (1)*
			07-09 (2)	
			09-15 (1)	
Western USA	13-17 (1)	09-12 (1)	06-08 (4)	18-19 (1)
		12-15 (2)	08-16 (3)	19-20 (2)
		15-17 (3)	16-19 (4)	20-22 (3)
		17-18 (2)	19-20 (3)	22-02 (4)
		18-20 (1)	20-22 (2)	02-04 (3)
			22-05 (1)	04-05 (2)
			05-06 (2)	05-07 (1)
				19-20 (1)*
				20-22 (2)*
				22-02 (3)*
				02-04 (2)*
				04-05 (1)*

* Indicates best time to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.
Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances use the preceding Short-Skip Chart.
#See explanation in "How To Use Short-Skip Charts" in this column.

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Fig. 3– QSL card received from KAØEOF and KB7RAV to mark the beginning of solar Cycle 23. The face of the sun is seen in H-Alpha. Bright spots on the sun's surface are sunspot clusters. In the lower left a large solar flare can be seen erupting into space. The original is in blazing red.

corresponds to an MUF of 60 MHz. This means that 50 MHz short-skip openings in a southwesterly direction are very likely to occur. The minimum skip distance expected on 50 MHz can now be found from fig. 2 by locating the intersection between 60 MHz on the ordinate (vertical scale) and the 50 MHz curve. The resulting distance is found to be 900 miles. A useful rule of thumb to remember is that when skip stations are heard less than *500 miles* away on 28 MHz, or less than *250 miles* away on 21 MHz, the chances are very good that 50 MHz will open in the same general direction.

From most locations in the continental United States 1300 mile E_s openings should extend into both Canada and Mexico. From the southern third of the country, it should also be possible to work a rather large number of countries in Central America and the West Indies during 15, 10, and 6 meter sporadic-*E* openings. Long-distance (DX) television reception also improves considerably during the summer months as a result of sporadic-*E* ionization. Signals from Low-band VHF TV stations (Channels 2–5), which normally cannot be received more than 75 or 100 miles away, suddenly are propagated up to 1300 miles, often with very strong signal levels.

Reflection from sporadic-*E* clouds takes place with very little signal loss, resulting in exceptionally strong signal levels during most openings, even when very low power levels are used. Quite often it is possible to maintain communication considerably off the great-circle path between two stations by means of back and side scatter from sporadic-*E* clouds. For example, a station in eastern New York state may work another station in the central part of the state if both stations point their antennas toward a common E_s cloud which is located, for example, over Georgia.

The ionized clouds which produce sporadic-*E* are erratic in their behavior and are known to drift generally in a westerly or northwesterly direction at approximately 150 to 250 miles per hour. The drift appears to be due to winds that exist in the ionosphere. Because of this drift skip zones change rapidly, and it is not uncommon for signal levels during sporadic-*E* openings to fade out completely from an S-9 plus level; these changes often take place in a matter of minutes.

Mail Bag

Please note my new e-mail address as <gja@gjainc.com>. I apologize to readers who tried to contact me at my other address <g.jacobs@ieee.org> and did not receive either a reply or return mail. This is my alias address with the Institute of Electrical and Electronics Engineers (IEEE), and it was linked to a former Internet provider. When I recently changed Internet providers, I neglected to change the link. If you sent me e-mail which did not receive a reply, please redirect to my new address.

Our web site URL remains as <http://www.gjainc.com>. Check it out for interesting information and links to major sources of HF radio propagation, geomagnetic and solar information, and time-

ly updates. The site is now undergoing an upgrade and new links are being added.

A nice note was received from Matt Salmaa, K1DCB, who says: "Thank you George for the interesting articles. I have been reading them for decades (been a ham since 1947). 73, Matt."

Another nice note was received from Chuck, KK6QU, who tells us: "I have just discovered the propagation charts in *CQ* magazine and am ecstatic. I am only just beginning to test them, but so far (for a week) I'm finding them very handy. Just wanted to say thank you."

Considering that a new sunspot cycle (Cycle 23) has recently begun, Dan, KAØEOF, and Cristi, KB7RAV, Anderson sent me a very appropriate QSL card with the following note: "Your monthly column and newly revised book have inspired me to learn more about propagation and solar cycles. It is also the focal point behind the design of my new QSL cards. Hopefully, they will inspire the hams I contact to also learn more or at least be inquisitive and search the web for solar information. After 18 years as a ham, I still have a lot to learn. 73, Dan."

The Anderson's card depicts the face of the sun taken in H-alpha light with sunspots and solar flares dramaticaly visible. While the solar picture is in blazing red, the card is reproduced in black and white in fig. 3.

VHF Ionospheric Openings

In addition to the increased sporadic-*E* propagation expected during May on the VHF bands, some ionospheric propagation is also likely to occur as a result of trans-equatorial scatter, meteor ionization, and auroral activity.

Some 6 meter, and perhaps 2 meter, trans-equatorial (TE) scatter openings should be possible during May. They are most likely to occur between 9 and 11 PM local daylight time on long north-south paths which cross the geomagnetic equator at approximately a right angle. TE openings favor locations in the southern third of the USA, but from time to time openings farther north may be possible.

The *Eta Aquarids* meteor shower should intersect the Earth's atmosphere between May 4 and 6. This should be a major shower, reaching maximum intensity during May 5, with an average of 20 meteors an hour. Chances are good for meteor-burst short-skip openings during the three-day period of this shower.

Some auroral activity may be possible during May, resulting in short-skip auroral-scatter-type openings on VHF. Such activity is most likely to occur during periods of ionospheric storminess. Check the Last-Minute Forecast at the beginning of this column for those days likely to be Below Normal or Disturbed during May.

73, George, W3ASK

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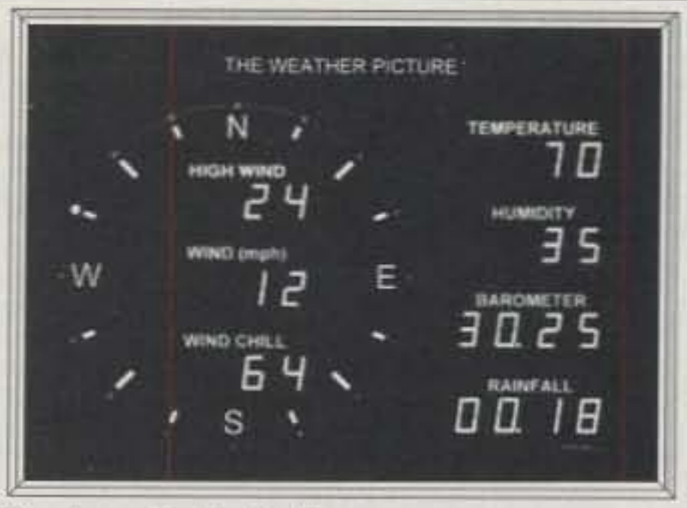

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CW RESULTS QRP/P SECTION WORLDWIDE

P4ØW	**A**	**4,070,080**	**1895**	**632**
		(Op: W2GD)		
KR2Q	**A**	**766,206**	**640**	**378**
K1VUT	**A**	**735,100**	**634**	**370**
LY2FE	**A**	**683,337**	**922**	**379**
VE3KP	**A**	**557,577**	**572**	**321**
UT4USX	**A**	**542,728**	**713**	**358**
N1TM	*	519,248	509	332
KX1M	*	452,570	489	334
		(Op: K1RC)		
G4UOL	**A**	**438,575**	**719**	**331**
KA4RRU	**A**	**422,484**	**485**	**327**
OE2S	**A**	**420,246**	**575**	**333**
		(Op: OE2VEL)		
N7IR	**A**	**385,207**	**481**	**359**
HP1AC	**A**	**380,094**	**462**	**286**
SM3CCT	**A**	**351,219**	**604**	**319**
W2TZ	*	283,143	423	291
LU1FC	**A**	**264,194**	**357**	**226**
		(Op: LU1FNH)		
OZ8AE	**A**	**264,000**	**432**	**300**
N6OJ	**A**	**161,840**	**314**	**238**
M7O	*	158,994	405	242
		(Op: G4JZO)		
PAØADT	**A**	**138,169**	**355**	**233**
ON7CC	**A**	**130,582**	**109**	**218**
CT1ETT	**A**	**113,300**	**304**	**206**
SM5DQ	*	109,668	277	222
W4DEC	**A**	**67,437**	**206**	**177**
YO4AAC	**A**	**57,620**	**260**	**172**
DK4CU	**A**	**55,840**	**211**	**160**
JA5CDL	**A**	**54,010**	**191**	**110**
YO2CJX	*	52,324	200	127
JF3IUC/2	*	50,058	182	103
HB9AYZ	**A**	**50,041**	**211**	**163**
AE4IC	*	45,698	165	146
K3WWP	**A**	**37,697**	**164**	**149**
K8CV	**A**	**37,422**	**142**	**126**
DL2TG	*	28,476	150	113
SP5XSB	**A**	**23,358**	**139**	**102**
DJ5QK	*	13,783	179	77
VE7CQK	**A**	**12,485**	**77**	**55**
IØKHP	**A**	**11,960**	**81**	**65**
DL2PY	*	7,315	83	77
K6FP	*	7,192	78	62
PAØTA	*	6,741	71	63
K9DTB	**A**	**2,824**	**47**	**45**
NQ7X	*	1,180	21	20
K5OI	*	476	20	17
LW3EBJ	**28**	**17,892**	**88**	**74**
KY5N	**28**	**4,425**	**66**	**59**
SP2QVS	**28**	**156**	**12**	**12**
JH6SQI	**28**	**30**	**6**	**6**
Z32DR	**21**	**97,271**	**268**	**211**
9A3GU	**21**	**34,560**	**153**	**135**
ES1CR	**21**	**25,440**	**137**	**120**
BV3FG	**21**	**23,067**	**179**	**99**
JH1HRJ	**21**	**22,560**	**106**	**96**
WA6FGV	**21**	**7,663**	**107**	**97**
JR1NKN	*	6,090	69	58
7K1CPT	*	96	6	6
WA8GHZ/5	**21**	**90**	**10**	**9**
VE7SBO	**14**	**466,474**	**506**	**358**
YU1GN	**14**	**245,079**	**433**	**313**
YU1LM	*	238,032	481	304
JH1GNU	**14**	**179,307**	**317**	**229**
G3LHJ	**14**	**87,048**	**222**	**186**
LY2BBF	**14**	**77,418**	**259**	**198**
YO4FRF	**14**	**74,704**	**275**	**203**
OH2YL	**14**	**64,620**	**225**	**180**
SP9EWO	**14**	**36,270**	**200**	**130**
N7VY	**14**	**30,636**	**152**	**138**
DL2KDW	**14**	**30,140**	**157**	**137**
JH3FTZ	*	29,585	111	97
K1SE	**14**	**17,150**	**105**	**98**
T94KW	**14**	**17,120**	**130**	**107**
JD1BJT/M	*	16,254	92	63
HS2JFW	**14**	**13,182**	**115**	**78**
SM6AHU	**14**	**6,901**	**75**	**67**
AA8UP	**14**	**4,104**	**55**	**54**
OM3TPL	**14**	**2,451**	**47**	**43**
SM7CZC	*	1,120	20	20
K2CS	**7**	**84,320**	**169**	**155**
VE3SMA	**7**	**59,160**	**141**	**102**
KC8UR	**7**	**44,100**	**199**	**147**
W8QZA/6	**7**	**18,080**	**91**	**80**
OK2ZS	**7**	**9,324**	**77**	**63**
S52SK	**7**	**9,176**	**69**	**62**
JA1KJW	**7**	**6,204**	**35**	**33**
W6RCL	*	420	16	15
SP4GFG	**3.5**	**141,024**	**321**	**208**
HABGK	**3.5**	**52,416**	**191**	**144**
W7DRA	**3.5**	**748**	**27**	**17**
S57M	**1.8**	**43,500**	**175**	**125**

SINGLE OPERATOR NORTH AMERICA

UNITED STATES

KQ2M	**A**	**6,964,656**	**2732**	**778**
K5ZD	**A**	**3,129,345**	**1647**	**591**
K1VW	**A**	**1,655,912**	**1089**	**461**
K5MA	*	1,007,920	794	430
KA1DWX	*	579,309	527	307
N4XR	*	546,472	116	104
KC1F	*	402,002	546	298
W1TE	*	391,312	410	272
W1WEF	*	366,795	522	297
WR1P	*	176,600	264	200
N1IA	*	110,430	200	135
K1BV	*	99,120	233	168
W1OHM	*	31,400	122	100
AJ1X	*	2,145	77	65
N1ET	**21**	**24,442**	**101**	**101**
KI1G	**14**	**3,326,930**	**1935**	**751**
K1ZM	**1.8**	**28,124**	**103**	**79**
***WA1LNP**	**A**	**1,695,376**	**1179**	**542**
***K1HT**	**A**	**723,387**	**617**	**343**
***WA1S**	**A**	**439,738**	**509**	**338**
*K1OA	*	359,600	419	290
*K1CB	*	171,521	304	229
*KD1YN	*	128,404	253	188
*KQ1V	*	117,448	284	212
*NR1F	*	116,871	312	239
*K1WD	*	34,632	135	117
*WO1N	*	17,091	91	81
***WF1L**	**14**	**640,668**	**742**	**406**
*AB1U	*	34,344	108	108
***W1MK**	**3.5**	**82,038**	**156**	**113**
N2NL	**A**	**7,032,033**	**2698**	**779**
K1AR	**A**	**2,108,704**	**1223**	**592**
WV2LI	**A**	**1,797,450**	**1294**	**521**
			(Op: N2GA)	
KW2J	*	1,437,132	1138	508
N2WLG	*	709,020	598	390
N1CC	*	655,603	630	377
W2YC	*	589,248	539	372
W2EZ	*	265,472	369	272
W2OMV	*	209,000	329	250
W2FR	*	135,272	220	148
W2HCA	*	133,172	223	169
W2UD	*	102,672	245	207
NA2X	**28**	**2,912**	**66**	**52**
N2OO	**14**	**179,608**	**289**	**286**
N2ZX	**7**	**418,950**	**358**	**245**
N2UN	*	331,264	319	256
K2ONP	**3.5**	**45,756**	**106**	**93**
K2YR	**3.5**	**45,562**	**141**	**109**
***WK2G**	**A**	**835,992**	**791**	**408**
***N2ED**	**A**	**561,005**	**545**	**365**
***KM2L**	**A**	**336,832**	**413**	**304**
*NA2Q	*	288,486	383	279
*WA2EYA	*	242,683	368	259
*W2LRO	*	106,650	221	158
*KG2BI	*	105,462	260	186
*K2UF	*	92,697	200	159
*N2KJM	*	32,396	105	89
*W5KI	*	29,666	105	91
*N2FF	*	26,334	101	99
*NT2W	*	18,525	83	75
*WA2VQV	*	5,032	37	37
***N2TN**	**7**	**327,888**	**307**	**264**
***N2GM**	**7**	**284,876**	**294**	**229**
*WA2BOI	*	26,082	71	69
*WB2DVU	*	1,320	15	15
K3ZO	**A**	**5,670,060**	**2143**	**726**
W3PP	**A**	**3,870,900**	**1795**	**660**
AA3B	**A**	**3,267,290**	**1623**	**613**
N3OC	*	1,178,463	876	451
N3NT	*	1,104,490	803	445
W3HVQ	*	970,704	759	428
WA3KWU	**7**	**2,005,466**	**950**	**487**
W3BGN	**7**	**1,015,044**	**632**	**337**
WA3DMH	*	28,842	72	69
***K1HTV**	**A**	**1,699,896**	**1070**	**517**
***WA3HAE**	**A**	**729,582**	**664**	**406**
***K3MD**	**A**	**528,775**	**549**	**328**
*WF3M	*	376,996	488	307
*N3TG	*	104,912	205	166
*KB3AFT	*	86,790	206	165
*W3TWI	*	86,553	207	117
*K3XZ	*	42,968	177	131
*N3UMA	*	5,334	49	42
***KA3MYM**	**21**	**540**	**15**	**12**
***NJ3K**	**14**	**208,152**	**430**	**294**
*W3FQE	*	15,665	82	65
***W3CP**	**7**	**160,822**	**214**	**191**
W4AN	**A**	**5,381,388**	**2192**	**747**
KT3Y	**A**	**4,468,860**	**2083**	**666**
NY4A	**A**	**3,866,037**	**2038**	**681**
			(Op: N4AF)	
WC4E	*	2,342,480	1499	623
AA4S	*	1,857,900	1246	550
W4AU	*	1,275,102	934	463
KB4GID	*	1,103,520	1009	480
N4TO	*	711,997	657	383
N4CW	*	510,264	505	342
K4LQ	*	321,504	389	272
W4XD	*	170,520	320	210
W4IF	*	168,048	280	216
K4VV	*	93,886	200	157
N4UH	*	27,512	80	76
W4VC	*	26,037	105	99
AA4WX	*	1,500	20	20
AE4RO	**28**	**27,552**	**240**	**161**
WC4DX	**28**	**23,125**	**171**	**125**
			(Op: W4YV)	
N4BP	**21**	**572,139**	**778**	**421**
W4WA	*	307,518	481	321
AE4SW	*	96,672	260	212
W9WI	**14**	**1,393,938**	**1236**	**546**
W4YE	*	142,888	268	212
NG4Z	*	134,015	312	245
WB4OSN	*	41,004	152	134
N4MM	*	28,458	103	93
W4YDD	**7**	**110,028**	**211**	**173**
K2UFT	*	24,924	107	93
K4ZW	**3.5**	**301,910**	**327**	**227**
***WO4O**	**A**	**1,216,800**	**1035**	**520**
***AA4GA**	**A**	**692,080**	**715**	**410**
***NW6S**	**A**	**688,551**	**648**	**391**
*N4CM	*	676,700	712	404
*KN4QV	*	600,456	561	381
*KN4T	*	349,448	333	242
*K1TO	*	340,340	404	286
*N8LM	*	317,228	423	284
*K4UVT	*	310,878	405	303
*K4FPF	*	282,285	350	255
*WA4JUK	*	248,899	348	259
*N4GJ	*	175,016	347	262
*K4UK	*	152,988	272	209
*WM4I	*	103,281	217	173
*K4OGG	*	63,096	157	132
*W4TYU	*	32,409	132	117
*K4NR	*	29,700	128	110
*WB4REC	*	22,487	124	113
*AA4LR	*	2,706	42	41
*KE4OAR	*	1,235	20	19
***KN4Y**	**21**	**110,376**	**431**	**252**
*K2ACW	*	27,921	137	123
*K4WW	*	7,260	60	60
***N4OT**	**7**	**238,140**	**305**	**245**
*AA4VV	*	120,984	161	142
*KW4T	*	113,142	210	173
*KE4LIA	*	140	4	4
K5YA	**A**	**3,328,886**	**1680**	**674**
K5YAA	**A**	**1,328,338**	**1043**	**499**
N6ZZ	**A**	**1,074,450**	**889**	**494**
WB5B	*	619,505	700	435
WA5VGI	*	538,656	668	372
WX5DX	*	454,300	566	350
NN5ZZ	*	376,992	627	352
K6AZA	*	8,550	112	41
NN5AA	**28**	**29,400**	**244**	**147**
			(Op: K5NA)	
NX5M	*	4,408	61	58
KM5G	**14**	**658,939**	**796**	**439**
WA5SOG	*	113,330	238	206
WD5CSK	*	60,480	196	168
NA5B	**7**	**772,200**	**731**	**396**
AC5AA	*	22,632	74	69
***WQ5L**	**A**	**1,754,004**	**1253**	**588**
***WD5K**	**A**	**892,904**	**757**	**478**
***AB5SE**	**A**	**304,560**	**481**	**324**
*K5WO	*	279,422	386	286
*NN5T	*	171,990	297	234
*K5OY	*	119,780	271	212
*AA5HV	*	32,431	131	113
*N5KB	*	943	53	41
***K5PN**	**14**	**137,852**	**327**	**241**
*K5XN	*	3,000	64	50
***NM5NM**	**7**	**574,544**	**585**	**298**
			(Op: AA5B)	
WR6AAA	**A**	**4,625,448**	**2223**	**744**
			(Op: N6IG)	
N6MU	**A**	**1,583,088**	**1041**	**559**
KO7Z	**A**	**1,419,086**	**1129**	**569**
KC6X	*	959,124	959	514
AG7W	*	438,273	456	233
			(Op: K6XX)	
K6GT	*	347,912	460	314
W6RFF	*	65,875	182	155
W6RN	*	26,068	104	98
KE6QXJ	*	14,812	106	92
W6BH	**14**	**145,664**	**322**	**256**
W6NKR	*	66,548	172	131
W7CB	**7**	**306,180**	**354**	**210**
NT6K	**3.5**	**19,635**	**115**	**85**
***KC6CNV**	**A**	**1,168,384**	**1015**	**448**
***WN6K**	**A**	**330,008**	**548**	**332**
***WX6V**	**A**	**307,648**	**420**	**304**
*N6GL	*	180,418	375	263
*KQ6ES	*	105,192	292	216
*WD6DX	*	55,809	211	159
*K6UM	*	30,303	126	117
*W6VNR	*	19,019	101	77
*AA6EE	*	11,934	110	78
***NP4IW/WX6**	**21**	**9,486**	**161**	**102**
*KU6T	*	7,055	83	79
***N6RT**	**14**	**139,416**	**272**	**222**
*K6HRT	*	127,738	296	221
*N6JM	*	84,372	188	158
*N6PLQ	*	5,936	62	56
***N6CMF**	**1.8**	**260**	**15**	**13**
W7HS	**A**	**388,620**	**460**	**340**
K7ABV	**A**	**258,382**	**383**	**274**
N6HR	*	209,844	300	268
KC7UP	*	138,868	272	233
KX7J	*	130,494	311	239
N7JXS	*	88,409	318	211
AB7RW	*	72,039	230	177
VE7UF/W7	**14**	**851,808**	**813**	**456**
K5ZM	**14**	**551,520**	**634**	**383**
K7ZZ	*	537,768	607	396
W7YS	*	50,718	180	158
W7AYY	*	4,033	37	37
W8AEF	**7**	**174,400**	**270**	**200**
WC7Q	*	107,364	213	138
KX7L	*	59,976	207	147
***W7YAQ**	**A**	**1,092,599**	**807**	**479**
***W7QN**	**A**	**278,640**	**457**	**324**
*AA7VG	*	55,420	291	163
*KK7A	*	30,381	166	123
***K7ZA**	**14**	**325,710**	**440**	**329**
*WJ7R	*	107,166	246	159
*AA7UN	*	65,305	203	185
N8AA	**A**	**358,800**	**400**	**300**
KF8TM	**A**	**255,570**	**383**	**254**
NO8DX	*	100,640	236	170
			(Op: K8MR)	
WAØFAX	*	87,920	187	157
K8DX	**14**	**2,673,125**	**1738**	**625**
K8GL	**14**	**2,477,800**	**1342**	**650**
***KV8Q**	**A**	**610,144**	**587**	**368**
***WA8WV**	**A**	**468,048**	**480**	**336**
***WT8P**	**A**	**310,365**	**405**	**285**
*K8GT	*	224,158	326	253
*NW8F	*	82,250	230	175
*W8IDM	*	51,170	170	170
*W8PN	*	39,770	125	97
*K8SM	*	33,792	167	132
*WB8BUO	*	19,646	105	94
***AF8C**	**14**	**17,952**	**113**	**96**
*W8RTU	*	1,484	35	28
WI9WI	**A**	**1,065,735**	**1107**	**495**
K9UQN	**A**	**185,724**	**300**	**231**
K9OM	**21**	**109,510**	**320**	**233**
WE9V	**14**	**2,113,251**	**1692**	**721**
K9NW	*	675,364	675	436
***WO9S**	**A**	**627,260**	**659**	**395**
***K9MMS**	**A**	**261,612**	**374**	**258**
*KJ9C	*	176,640	303	230
*N9YXA	*	32,384	179	128
***K9AA**	**14**	**244,818**	**391**	**261**
			(Op: K9PG)	
***K7CK**	**7**	**19,836**	**105**	**87**
*KC9TV	*	9,430	43	41
N7DR	**A**	**2,530,560**	**1534**	**640**
KMØL	**A**	**1,519,298**	**1243**	**583**
KØFX	**A**	**754,814**	**828**	**538**
NSØB	*	689,724	691	414
K9WIE	*	380,160	482	352
KJØG	*	272,160	359	280
WØHW	*	83,840	200	160
WØTT	*	73,048	237	184
WRØA	*	56,780	218	167
			(Op: WØMU)	
K2VV	**14**	**2,461,342**	**1656**	**691**
WØTM	**14**	**1,027,564**	**868**	**524**
KSØKS	*	292,941	644	363
KGØUA	*	138,744	279	246
KØAV	**7**	**423,384**	**451**	**299**
***WBØOLA**	**A**	**229,858**	**413**	**281**
***KEØUI**	**A**	**205,632**	**368**	**272**
*KØRX	*	171,828	310	222
*KØRY	*	55,772	177	146
*KGØEJ	*	2,880	32	32

CUBA

***CO2KG**	**A**	**1,044,870**	**816**	**435**

MARTINIQUE

FM5CD	**14**	**2,909,485**	**1723**	**659**
FM5BH	**3.5**	**833,490**	**536**	**315**

PANAMA

***HP3XUG**	**A**	**273,600**	**378**	**228**

ST. VINCENT

***J87GU**	**A**	**2,519,454**	**1542**	**538**
		(Op: DL7VOG)		

ALASKA

KL7RA	**14**	**483,732**	**579**	**324**
NL7Z	**1.8**	**3,634**	**34**	**23**

US VIRGIN ISLANDS

***WP2Z**	**A**	**7,907,666**	**3065**	**806**
		(Op: SM4CNN)		

PUERTO RICO

WP4KOE	**A**	**968**	**22**	**22**
KP3P	**14**	**2,926,620**	**1774**	**639**
		(Op: WP3A)		
WP3CW	**7**	**5,158,240**	**1577**	**626**
		(Op: NP3A)		
***WP4LNQ**	**A**	**46,886**	**157**	**119**
***NP3A**	**21**	**1,419,595**	**1113**	**485**
		(Op: KP3L)		
***KP3W**	**14**	**29,200**	**104**	**100**

ANTIGUA

V26BA	**7**	**6,227,550**	**1812**	**659**
		(Op: N2BA)		

CANADA

VE3EJ	**A**	**6,768,294**	**2631**	**741**
VY1JA	**A**	**126,038**	**265**	**187**
VE2GHI	**A**	**44,178**	**134**	**111**
VE3HX	**28**	**3,780**	**48**	**35**
VE7SZ	**14**	**3,324,843**	**1878**	**701**
		(Op: VE7NTT)		
VE7AV	*	1,525,860	1135	519
***VF6JO**	**A**	**1,309,952**	**1087**	**476**
***VE2AWR**	**A**	**841,090**	**753**	**349**
***VA3NR**	**A**	**764,943**	**696**	**321**
***VE6KRR**	**A**	**604,180**	**695**	**340**
*VE3IAY	*	430,321	471	289
***VF4YU**	**A**	**205,301**	**350**	**239**
*VE3STT	*	124,200	229	180
***VO1MP**	**A**	**74,820**	**200**	**145**
***VE5SF**	**A**	**23,936**	**105**	**88**
***VE3KZ**	**21**	**195,024**	**327**	**239**
***VE6BMX**	**14**	**813,150**	**765**	**450**
***VE4VV**	**14**	**604,604**	**771**	**364**
***XM7A**	**7**	**2,141,034**	**1105**	**399**
		(Op: VE7SV)		
***VE3YGN**	**3.5**	**13,300**	**77**	**50**

TURKS & CAICOS IS.

VP5GN	**A**	**10,675,330**	**3491**	**794**
		(Op: K5GN)		

BERMUDA

***AHØR/VP9**	**A**	**31,264**	**187**	**118**
		(Op: JR6RTO)		

MEXICO

***4B1AC**	**A**	**186,850**	**406**	**202**
		(Op: XE1BEF)		
*XE1ABE	A	93,330	233	170
***XE2AC**	**28**	**9,576**	**76**	**57**

NICARAGUA

***YN6WFM**	**A**	**1,641,915**	**1257**	**465**
		(Op: JA6WFM)		

CAYMAN IS.

ZF2NE	**14**	**4,122,334**	**2268**	**706**
		(Op: W5ASP)		

MARITIME MOBILE

***SP1LJP/MM**	**A**	**467,307**	**802**	**379**

AFRICA

MAURITIUS

***3B8/NK6F**	**A**	**494,450**	**585**	**275**

SWAZILAND

3DA5A	**A**	**4,431,056**	**2112**	**572**
		(Op: JM1CAX)		

TUNISIA

3V8BB	**A**	**11,884,728**	**3650**	**778**
		(Op: YT1AD)		

UGANDA

5X4F	**A**	**672,280**	**618**	**343**

ALGERIA

7X2RO	**A**	**6,059,438**	**3150**	**511**
		(Op: OM3CGN)		

MOROCCO

***CN8GB**	**21**	**185,368**	**330**	**188**

CANARY IS.

***EA8ASJ**	**A**	**297,000**	**542**	**275**

CEUTA AND MELILLA

EA9UG	**7**	**1,030,906**	**561**	**307**

AFRICAN ITALY

IZ9R	**A**	**7,435,560**	**2927**	**660**

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SEYCHELLES

S79MAD	A	202,391	322	203

IVORY COAST

*TU4FF	21	1,341,472	1091	412
		(Op: OH8SR)		

ASCENSION IS.

ZD8Z	A	11,583,950	3888	805

SOUTH AFRICA

ZS6AJS	A	236,817	317	189

ASIA

AZERBAIJAN

*4K9W	A	113,354	204	157

SRI LANKA

*4S7OF	21	14,630	118	77

ISRAEL

4X1VF	28	69,620	200	118
4X/OK1JR	21	2,018,285	1415	515
4X4NJ	1.8	210,248	226	164
*4Z5AX	21	135,248	471	107
*4Z5FW	"	86,720	200	160
*4Z4TA	14	413,976	500	282

SAUDI ARABIA

HZ1AB	A	4,475,488	2288	608
		(Op: SMØCXU)		
7Z5OO	A	3,931,588	2208	561
		(Op: K3UOC)		

MALAYSIA

*9M2TO	A	891,660	1091	386

SINGAPORE

*9V1ZB	A	1,283,814	1341	443

CHINA

*BA4TB	7	87,330	236	123

TAIWAN

BV7FF	A	264,427	635	269

TURKMENISTAN

*EZ8CW	A	10,660	66	65

KOREA

*HL5AP	A	86,523	514	191

THAILAND

HS5AC	A	397,800	707	300

JAPAN

JH5FXP	A	4,236,044	2003	652
JH4UYB	A	3,981,312	2051	648
JAØWQO	A	663,741	840	351
JF2SKV	"	619,236	625	334
JH2NWP	"	475,543	522	307
JA1QZC	"	232,845	300	215
JR1LEV	"	196,490	299	245
JA3ARM	"	144,894	274	186
JA1HP	"	124,160	263	194
JA2VQF	"	120,142	300	127
JAØQNJ	"	100,488	230	159
JA2QVP	"	37,224	126	88
JA5AIQ	"	23,760	270	88
JO1QZI	"	11,832	64	58
JA1WHG	"	10,088	67	52
JA5FMT	"	9,975	74	57
JQ1NGT	"	6,622	50	43
JR6CF	"	5,130	39	38
JH4CPC	"	4,680	64	30
JA6ZLI	28	1,312	40	32
JIØXKK	21	4,998	47	42
JH4JNG	14	505,494	572	333
JA9CWJ	14	378,810	450	305
JA5APU	"	143,441	290	191
JR3XEX	"	38,082	148	116
JA1YXP	7	1,066,728	603	338
JA1MSS	"	29,232	93	72
JA5IP	"	17,284	70	58
JA5PEE	"	132	6	6
*JA6UBK	A	922,647	781	383
*JEØUXR	A	573,016	600	328
*JK1KNB	A	358,375	462	305
*JN1NOP	"	331,702	455	266
*JA2BY	"	315,997	413	253
*JM1NKT	"	313,632	418	242
*JA1BUI	"	234,693	293	267
*JS1UMQ	"	134,100	236	150
*JA8AJE	"	117,040	265	152
*JA6TQ	"	105,600	227	150
*JH1DYV	"	104,580	240	166
*JQ2FFS	"	96,792	206	148
*JA2IU	"	80,509	177	143
*JF1LAU	"	70,964	193	113
*JA1GTF	"	65,024	182	127
*JA4AQR	"	63,450	169	141
*JA9DDF/2	"	58,580	175	145
*JE9LLO	"	54,740	153	115
*JAØBMS/1	"	50,031	155	109
*JF1SQC	"	48,285	150	111
*JA7KM	"	43,392	146	96
*JA1AB	"	29,562	125	78
*7K1EQG	"	29,003	130	97
*JAØBJY	"	25,470	111	90
*JA1BRL	"	20,910	105	82
*JK1UJT	"	20,907	94	69
*JE9PFD	"	13,020	74	62
*JE1KUP	"	11,660	62	53
*JE4SDB	"	8,652	57	42
*JA1AAT	"	8,160	62	51
*JA6SRB	"	6,987	53	51
*JH1UES	"	4,485	43	39
*JHØEPI	"	3,815	37	35
*JA1MXY	"	2,484	35	27
*JG1FGL	"	25	5	5
*JL1CVG	28	1,886	52	41
*JJ1GQH	21	22,750	100	91
*JA6BIF	"	17,888	94	86
*JA1XPU	"	666	19	18
*7M1MCT	14	1,756,656	1207	528
*JA7XBG	14	1,336,488	1001	478
*JM4WUZ	14	427,305	522	305
*JA2XI	"	271,956	375	262
*JA5TXA	"	107,970	235	177
*JR4GPA	"	99,372	224	169
*JL3OXR	"	83,028	202	148
*JA1KI	"	58,557	172	149
*JA1CP	"	34,650	126	110
*JK1OXU	"	29,165	115	95
*JA9KUG	"	17,739	90	81
*JD1BJT/M	"	16,254	92	63
*JA3EEM	"	6,345	61	47
*JA1BBA	"	5,842	51	46
*JK1LUY	"	1,452	23	22
*JG3WCZ	"	768	16	16
*JO3JJN	"	714	18	17
*JA7AXP	"	403	15	13
*JE1VTZ	7	84,474	3148	117
*JRØBQD	"	62,272	150	112
*JL1MWI	"	12,444	61	51
*JA9DOF	3.5	320	8	8
*JE1SPY	1.8	28	7	7

MONGOLIA

JT1BH	A	632,114	831	326
JT1CD	"	377,340	706	285

TURKEY (ASIATIC)

YM2ZW	14	3,148,368	1829	613

ASIATIC RUSSIA

RAØFF	A	1,600,662	1271	483
UAØLCZ	A	454,176	722	288
UAØFDX	"	134,596	265	161
RAØCG	3.5	83,692	232	122
*UAØFZ	A	530,600	672	350
*RAØJX	"	90,900	209	150
*UAØJQ	14	1,454,221	1178	529
*RAØFW	7	1,154,880	767	360
*RAØFA	"	657,199	501	293
UA9CLB	A	2,427,550	1264	470
RW9JO	A	1,629,490	1074	470
UA9MA	A	1,342,209	969	457
RW9UP	14	1,119,288	1000	447
UA9XEN	"	645,968	608	376
RA9XF	"	513,252	584	318
RU9CZE	7	1,412,208	698	378
UA9DD	3.5	327,156	289	199
*RA9AE	A	559,952	530	282
*UA9AJD	21	23,030	100	94
*RX9JN	14	1,079,891	912	457
*RA9XU	"	240,660	354	252

KAZAKSTAN

UN7LZ	A	3,354,624	1701	624
*UK7F	A	193,998	310	217
*UN7FZ	"	125,732	265	172
*UN9FB	7	112,320	173	135

HONG KONG

VS97BG	A	1,029,645	1253	435

EUROPE

ITU GENEVA

4U1ITU	A	2,493,680	1881	610
		(Op: K5RX)		

ITU VIENNA

4U1VIC	A	2,928,723	2255	623
		(Op: OE1EMS)		

CROATIA

9A5I	A	1,745,863	1532	563
9A1CEI	28	10,956	121	83
9A2WJ	7	176,204	314	217
9A4RU	3.5	109,686	290	181
*9A4RC	A	518,148	770	333
*9A3SM	A	432,912	624	348
*9A3VL	"	267,584	499	296
*9A3HW	"	213,537	353	237
*9A4KA	"	169,725	375	219
*9A3ZO	"	70,307	243	167
*9A2OO	"	60,445	170	155
*9A/ OK2SWD/P	"	52,745	192	137
*9A6KCL	28	8,541	108	73
*9A3QK	3.5	124,264	308	196

MALTA

9HØA	28	590,914	1525	359
		(Op: 9H1EL)		

PORTUGAL

CT4DX	7	130,350	194	165
*CT1ELP	28	17,472	170	91
*CT1AOZ	21	756,792	978	457
*CT1BQH	14	450,492	715	372

GERMANY

DL6FBL	A	4,532,544	2202	732
DL9FBS	A	2,100,553	1438	533
DFØFS	A	963,806	1071	446
		(Op: DL1EKC)		
DL1JF	"	771,256	784	428
DL2NWK	"	749,905	825	415
DL2RMC	"	724,140	1000	405
DL7BQ	"	618,030	832	378
DL4HRM	"	490,394	700	359
DL3BQD	"	425,445	607	339
DL1TH	"	340,545	550	311
DL5BUT	"	193,248	338	244
DAØSI	"	157,472	401	224
DK7ZH	"	105,876	271	204
DL3DRN	"	93,740	227	215
DL1JPL	"	90,602	250	178
DL2HUM	"	38,250	150	125
DK7AN	"	17,860	90	76
DL5FCO	"	7,812	72	62
DL9NEK/P	28	22,627	177	121
DK3KD	"	10,965	110	85
DL7UBA	14	1,015,065	948	515
DL5YM	14	537,602	659	403
DL2DBV	"	405,484	616	356
DL8UD	"	120,744	297	234
DL6RAI	7	1,989,750	1155	525
DL1EMH	"	253,232	402	266
DL5AUJ	"	1,496	18	17
DL8WN	3.5	348,752	543	284
*DLØMFL	A	608,587	764	383
*DJ8NI	A	537,540	742	372
		(Op: DL1MGB)		
*DJ7IK	A	536,934	685	348
*DL5ZB	"	531,416	674	362
*DJ1OJ	"	498,253	675	371
*DF1DV	"	484,220	650	341
*DF2KK	"	471,150	687	349
*DL1SDW	"	443,492	605	337
*DL4VAD	"	432,760	609	349
*DK7FP	"	428,675	536	325
*DL6AG	"	389,946	575	333
*DL5JRA	"	308,700	501	300
*DL7VOX	"	302,764	415	308
*DL5SVB	"	291,648	501	294
*DL3ZAI	"	289,372	542	292
*DK9IP	"	245,797	403	271
*DL4XU	"	201,628	428	266
*DL2YAR	"	160,083	372	231
*DL1SAN	"	150,525	383	223
*DL4BQE	"	137,600	312	200
*DL8WCM	"	119,957	235	209
*DL6UAM	"	115,290	310	210
*DL2GBB	"	112,710	300	195
*DL4TJ	"	110,495	300	205
*DK5ZX	"	104,721	300	201
*DL3HSC	"	101,850	350	210
*DL4OCM	"	101,712	178	163
*DL3BZZ	"	95,023	227	167
*DL5WS	"	82,460	203	155
*DL4JYT	"	78,660	276	190
*DL6KVA	"	69,498	190	117
*DL8UVG	"	65,403	252	169
*DL5ST	"	53,053	200	143
*DL6NDQ	"	3,906	50	42
*DL1MDY	"	713	25	23
*DL7BY	28	12,740	124	91
*DF5WN	"	7,992	93	72
*DJ4KW	"	875	28	25
*DL3BRA	21	45,240	183	156
*DL1YAW	14	320,760	455	297
*DJ9DZ	14	297,724	524	343
*DL1EFD	"	166,926	342	258
*DL5DSA	"	123,723	302	233
*DK7GH	"	111,804	279	231
*DJ2YE	7	156,648	289	214
*DL1CW	7	155,064	300	213
*DL7UXG	"	16,704	105	87
*DL6RDE	"	10,744	84	68

SPAIN

EA2IA	A	4,320,945	2460	705
EA3FHN	A	807,312	903	417
EA1ABM	A	442,548	718	342
EA1JO	"	150,304	370	244
EA1FBU	"	111,639	350	199
EA3DU	"	9,620	83	65
EA7CWA	"	8,946	67	60
EA1NK	14	287,000	603	328
*EA5YU	A	484,416	692	348
*EA4AAF	A	307,133	579	281
*EA7GXD	A	208,495	386	245
*EA7KN	"	205,434	427	226
*EA4BGM	"	199,880	497	263
*EA2CHI	"	148,208	335	236
*EA1FBJ	"	148,072	351	223
*EA3BOW	"	128,691	347	237
*EA5DCL	"	127,920	303	240
*EA2GC	"	118,916	314	217
*EA7CA	"	63,960	188	156
*EA7TG	"	32,428	139	121
*EA7AKJ	28	5,600	72	56
*EC3AHO	21	59,786	221	167
*ED3ALN	14	2,252,050	1907	617
*EA1ND	"	57,375	200	153
*EA3AHQ	7	404,928	583	296
*EA2CAR	"	55,692	155	126

BALEARIC IS.

*EA6ZS	A	32,472	170	132

IRELAND

*EI4DW	A	462,266	563	371
*EI4II	"	160,062	347	222
*EI8GP	14	312,336	500	324

MOLDOVA

ER1EA	14	14,756	80	62

ESTONIA

ES5MC	A	1,976,127	1571	579
ES4RD	14	146,816	345	248
*ES1QD/Ø	A	1,034,000	1252	440

BELARUS

EW6AF	14	132,720	311	237
*EU1SA	A	290,115	491	307
*EW1NY	"	218,526	410	242
*EW6XE	14	108,648	300	216
*EW1EA	"	71,621	236	187
*EW6AL	7	319,784	440	284
*EV6M	"	272,480	415	262
*EW3AC	3.5	72,168	258	158

FRANCE

TM8R	A	5,354,440	2543	728
		(Op: F6FGZ)		
TM4Q	A	3,327,075	2043	675
		(Op: F6FYA)		
TP9CE	A	3,249,624	2225	644
		(Op: F5MUX)		
F5NBX	"	1,953,050	1659	550
F6HWU	"	836,405	1010	409
F6IRA	"	700,730	992	395
F5OJL	"	299,728	495	286
F2AR	"	264,983	500	281
F5TNI	"	203,315	340	259
F5POJ	"	158,991	379	201
F6CXJ	"	52,214	200	154
F6ICM	14	12,144	100	92
TM4ZZ	7	2,428,160	1268	542
		(Op: F6ARC)		
*F5PRH	A	938,700	950	420
*TM5A	A	889,083	1088	447
*F5JBR	A	631,551	737	393
*F5EJC	"	486,239	604	331
*F5PIQ	"	402,732	557	339
*F5YJ	"	301,560	512	280
*F5ROX	"	283,925	514	277
*F6IIE	"	221,400	502	270
*F5NQL	"	183,136	400	236
*F5RAB	"	143,918	361	227
*F5OIH	"	117,708	294	204
*F6GQO	"	66,249	212	153
*F6HNX	"	60,348	173	141
*FB1AVO	"	28,098	147	126
*F6HHR	"	27,195	143	111
*F2FX	"	14,400	110	72
*F5OGG	"	4,400	62	55
*F5NLY	14	460,400	616	400
*FB1OMN	"	23,364	114	99
*F5LMJ	7	281,672	403	274
*F5NSO	"	1,159	14	12
*F5RZJ	1.8	6,018	59	51

ENGLAND

G3ZEM	A	4,106,520	2396	680
GØJQN	A	560,096	815	368
G3TXF	"	334,606	468	293
G7G	14	730,689	949	453
		(Op: GØLII)		
G6QQ	7	188,770	290	215
*GX4MBC	A	1,922,480	1519	560
		(Op: G4BWP)		
*G3XTT	A	1,558,339	1259	527
*M7A	A	835,684	993	401
		(Op: G4ZFE)		
*G5LP	"	481,988	619	338
*G3ESF	"	471,848	727	338
*G3OOU	"	304,556	524	298
*G3RSD	"	205,998	437	247
*G5MY	"	88,290	224	162
*G4ZME	"	46,812	185	141
*GXØSOA/P	14	166,050	403	270
		(Op: GØOGN)		

NORTHERN IRELAND

GIØKOW	A	6,325,953	2889	813
		(Op: GIØNWG)		

SCOTLAND

*GM4SID	A	606,360	868	372
*GM3CFS	14	240,207	453	319

WALES

GW4BVJ	14	538,692	723	371

HUNGARY

HA3NU	A	2,360,590	1780	590
HA6NL	A	1,709,868	1342	534
HA3LI	"	1,463,076	1364	513
HA3UU	14	3,874,668	2175	772
HA4FF	7	448,842	537	313
*HA8IE	A	817,976	849	472
*HA9PB	A	87,744	230	192
*HAØUU	"	75,240	345	120
*HA8ZO	"	59,361	176	141
*HA8RH	14	1,419,872	1238	586
*HA6NW	"	297,627	479	319
*HA3JB	"	279,718	500	323
*HA3LN	7	514,752	651	336
*HA8EU	3.5	442,800	646	300

SWITZERLAND

HB9DCM	A	541,502	665	353
HB9CRV	"	104,434	296	202
HB9FMD	3.5	366,424	520	281
*HB9ARF	A	507,840	707	345
*HB9CVO	"	110,495	389	205
*HB9AB	"	26,712	140	126
		(Op: HB9BOW)		
*HB9GCD	7	454,272	551	312
		(Op: OK1EE)		

ITALY

IQ4A	A	3,779,721	2227	657
IUØX	A	1,639,140	1525	510
		(Op: IKØFWI)		
IU3V	A	1,514,264	1420	488
IK5TSS	"	1,089,918	1132	453
IQ3AC	"	342,432	569	288
		(Op: I3FDZ)		
IK1RQQ	"	137,634	313	226
IK8TPJ	"	81,674	308	194
I1VTX	"	53,620	200	140
IV3TQE	"	52,360	161	140
IR7A	"	52,260	188	134
		(Op: I7ALE)		
IQ7A	14	1,517,982	1481	587
		(Op: IK7XIV)		
IR4T	7	2,874,690	1421	585
		(Op: IK2QEI)		
*IKØYVV	A	1,482,182	1314	523
*IU4F	A	508,032	736	384
		(Op: IK4ZHH)		
*IN3QBR	"	115,415	300	205
*IK3SCB	"	48,990	186	142
*IKØADY	"	44,616	159	132
*IZØAEH	"	13,692	90	84
*IKØYUM	"	12,600	80	63
*I7PXV	21	76,042	282	193
*I5OQV	7	13,248	85	59

SARDINIA

ISØUWX	A	37,446	192	158

SICILY

IT9BLB	3.5	421,850	551	295
*IT9ORA	A	362,212	666	332
*IT9AJP	"	84,488	256	179
*IQ9AF	21	579,336	940	404

NORWAY

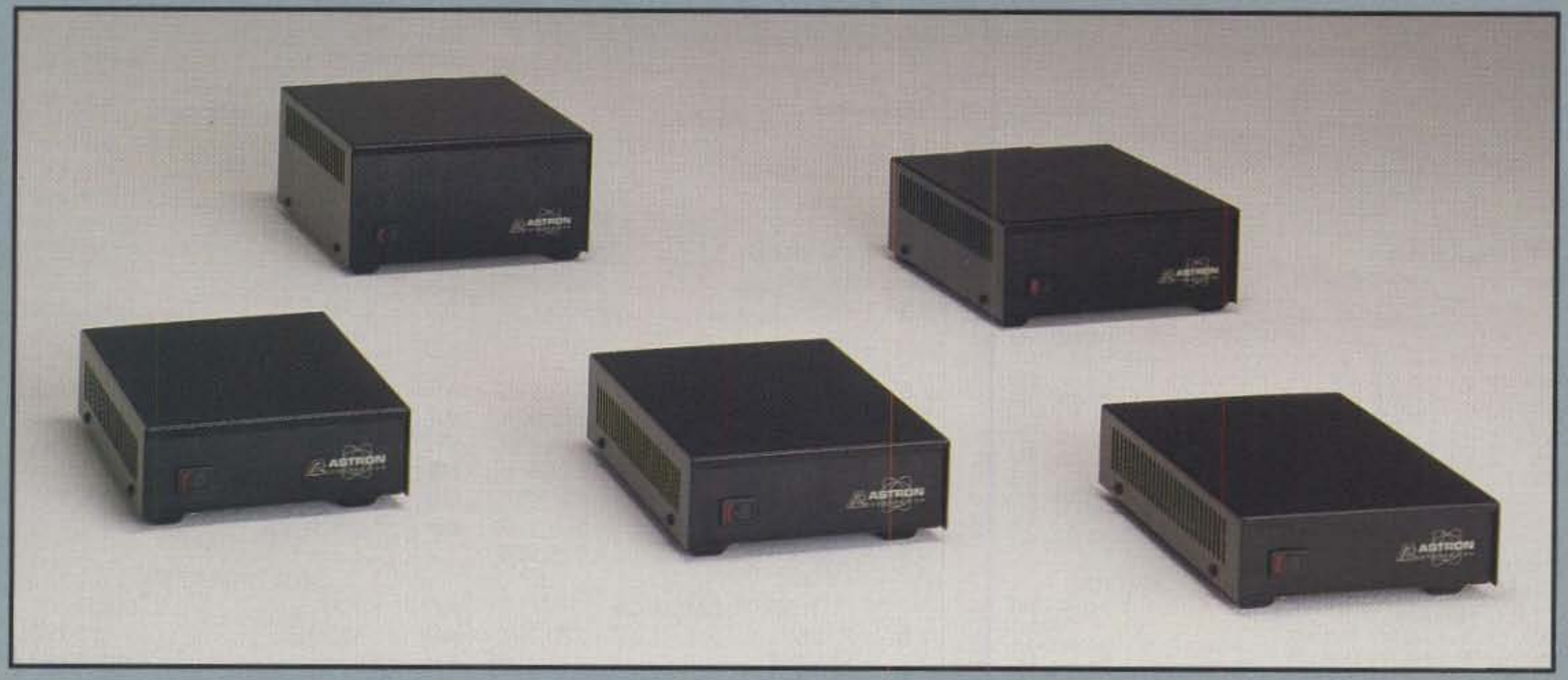
LA4XT	A	5,616	50	48
LA7MFA	14	149,424	405	264
LA9HFA	"	15,438	100	93
LA9GX	3.5	393,408	595	288
LA6FJA	1.8	14,892	106	73
LA8SDA	"	285	159	93
*LA5LJA	A	247,095	439	289
*LA9AU	14	171	9	9
*LA7AK	7	396,136	503	293

LITHUANIA

LY3MR	A	2,782,261	1817	643
		(Op: LY2BIL)		

Say You Saw It In CQ

.... POWER ON WITH ASTRON
SWITCHING POWER SUPPLIES ....



SPECIAL FEATURES:

•HIGH EFFICIENCY SWITCHING TECHNOLOGY SPECIFICALLY FILTERED FOR USE WITH COMMUNICATIONS EQUIPMENT, FOR ALL FREQUENCIES INCLUDING HF.
•HEAVY DUTY DESIGN
•LOW PROFILE, LIGHT WEIGHT PACKAGE.
•EMI FILTER
•MEETS FCC CLASS B

PROTECTION FEATURES:

•CURRENT LIMITING
•OVERVOLTAGE PROTECTION
•FUSE PROTECTION
•OVER TEMPERATURE SHUTDOWN

SPECIFICATIONS:

INPUT VOLTAGE: 90-132 VAC 50/60Hz
OR 180-264 VAC 50/60Hz
SWITCH SELECTABLE
OUTPUT VOLTAGE: 13.8 VDC

MODEL	CONT. AMP	ICS	SIZE (Inches)	WT.(LBS)
SS-10	7	10	2.3 x 6 x 9	3.2
SS-12	10	12	2.3 x 6 x 9	3.4
SS-18	15	18	2.3 x 6 x 9	3.6
SS-25	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30	25	30	3 3/4 x 7 x 9 5/8	5
SS-25M*	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30M*	25	30	3 3/4 x 7 x 9 5/8	5

- *with separate volt & amp meters
- All SS power supplies are available in a RACK MOUNT VERSION (3.5 x 19 x 9 3/8)
- To order Rack Mount Version change SS to SRM (example: SRM-10)

ASTRON CORPORATION

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CIRCLE 163 ON READER SERVICE CARD

LY6M	**A**	**2,645,739**	**1810**	**657**
			(Op: LY1DS)	
LY6K	**A**	**2,192,298**	**1629**	**573**
LY2PAQ	*	1,037,760	1026	460
LY2KM	*	522,039	710	383
LY3ID	*	379,953	604	333
LY2BZ	*	183,951	358	243
LY2DX	*	63,365	202	145
LY3BU	*	5,184	59	54
LY2OX	**14**	**1,056,032**	**1001**	**488**
LY2BN	*	511,250	703	405
LY3BAD	*	70,308	209	189
LY2HN	**7**	**307,736**	**399**	**269**
LY1DD	**3.5**	**431,460**	**647**	**306**
***LY3JY**	**A**	**898,372**	**1026**	**428**
***LY2FN**	**A**	**744,341**	**888**	**403**
*LY3CW	*	468,431	697	353
*LY3NJM	*	184,392	399	234
*LY3MV	*	146,507	320	239
*LY3GJ	*	46,760	187	140
*LY3BA	*	30,800	129	110
***LY2BTA**	**28**	**54**	**6**	**6**

BULGARIA

LZ1BJ	**A**	**1,230,248**	**1369**	**488**
LZ2DL	*	66,132	175	167
LZØHST	*	49,910	184	161
			(Op: LZ1UQ)	
LZ6C	**28**	**36,400**	**253**	**130**
LZ1KSN	**14**	**103,512**	**395**	**227**
LZ1ZM	*	57,879	235	177
***LZ2UZ**	**A**	**64,010**	**180**	**173**
*LZ4BU	*	27,126	115	99
***LZ1FJ**	**7**	**3,010**	**41**	**35**
***LZ2MP**	**14**	**201,888**	**480**	**288**

AUSTRIA

OE3TL	**A**	**104,372**	**239**	**194**
OE1TKW	*	89,075	222	175

FINLAND

OH6NIO	**A**	**2,745,840**	**1842**	**673**
OH6AG	**A**	**1,243,725**	**1090**	**515**
			(Op: OH6KZP)	
OH6XY	*	890,892	1170	438
OH5VT	*	519,692	633	346
OH3MMH	**28**	**8,906**	**114**	**73**
OH1MM	**21**	**165,663**	**761**	**411**
OH5LF	**14**	**3,490,170**	**2143**	**734**
			(Op: OH1WZ)	
OH1NOR	**14**	**3,481,896**	**2095**	**726**
OH2LU	*	140,112	326	252
***OH3KCB**	**A**	**275,576**	**500**	**259**
***OH2LNH**	**A**	**104,583**	**268**	**213**
*OH6RC	*	72,890	280	197
*OH7NW	*	65,928	242	164
*OH6FW	*	14,965	109	73
*OH3LZU	*	10,812	74	68
***OH3MEO**	**28**	**11,776**	**121**	**92**
***OH3LQK**	**21**	**31,122**	**182**	**133**
***OH8BQT**	**14**	**571,976**	**794**	**424**
*OH3MC	*	19,336	147	132

ALAND IS.

OHØTA	**14**	**2,803,166**	**2066**	**674**

CZECH REPUBLIC

OK2DA	**A**	**1,011,150**	**997**	**450**
OK7DX	**A**	**960,725**	**1150**	**415**
OK1AUC	**28**	**9,348**	**102**	**76**
OK2ABU	*	1,392	40	29
OK1XC	*	858	28	26
OL6A	**21**	**166,660**	**407**	**260**
			(Op: OK2ON)	
OK2PCL	21	37,488	148	132
OK1RF	**14**	**3,433,254**	**1985**	**726**
OK1KSD	**7**	**1,226,700**	**837**	**435**
			(Op: OK1CS)	
OL4M	*	531,552	591	339
			(Op: OK1ARN)	
OK2GG	*	325,416	407	273
OK1FPG	**3.5**	**375,084**	**557**	**302**
OK1EW	**3.5**	**335,104**	**548**	**272**
OL4U	**1.8**	**129,592**	**346**	**194**
			(Op: OK1NG)	
***OK1YM**	**A**	**984,526**	**1064**	**422**
***OK1JOC**	**A**	**957,334**	**1035**	**427**
***OK2QX**	**A**	**808,974**	**919**	**426**
*OK2EC	*	802,272	896	411
*OK2DU	*	600,738	802	354
*OK1DSZ	*	580,260	727	380
*OK1ZP	*	451,059	600	329
*OK1AVY	*	421,328	634	332
*OK1SI	*	410,075	575	349
*OK2BND	*	308,363	520	289
*OK1KZ	*	274,960	460	280
*OK5SAZ/P	*	261,976	483	286
*OK1AAZ	*	238,872	458	269
*OK2VWB	*	205,884	400	252
*OK2PHC	*	186,750	425	249
*OK1KT	*	148,088	692	214
*OK1FCA	*	137,560	266	190
*OK2BCZ	*	91,098	241	172
*OK2BUT	*	65,394	227	173
*OK1AXB	*	58,102	169	139
*OK1DOL	*	54,234	171	131
*OK1AOU	*	52,130	172	130
*OK2BDI	*	41,736	134	111
*OK2BHE	*	799	17	17
***OK2EQ**	**28**	**1,961**	**46**	**37**
***OL8M**	**21**	**177,240**	**373**	**280**
*OK2SAT	*	124,020	290	234
*OK2PSA	*	1,421	33	29
***OK1FFU**	**14**	**1,087,310**	**1018**	**490**
*OK1MKI	*	183,168	404	288
*OK2TBC	*	169,389	355	261
*OK1AXA	*	121,393	315	233
*OK2PBG	*	118,260	284	219
***OK1XW**	**7**	**871,024**	**747**	**404**
*OK1IE	*	271,206	322	247
*OK1JN	*	28,512	115	99
***OL3Z**	**3.5**	**141,768**	**348**	**198**
*OK1HGM	*	102,648	256	182
*OK1DDV/P	*	2,880	42	36

SLOVAKIA

OM8A	**A**	**4,812,160**	**2321**	**730**
			(Op: OM3RM)	
OM8FF	**14**	**1,924,208**	**1502**	**638**
OM5CD	**1.8**	**155,490**	**340**	**213**
***OM3PQ**	**A**	**320,422**	**534**	**302**
***OM8ON**	**A**	**315,268**	**424**	**293**
*OM3CDZ	*	233,060	501	271
*OM1AF	*	136,413	310	207
*OM3IF	*	55,720	173	140
*OMØTT	*	28,335	132	107
***OM7YC**	**21**	**7,735**	**71**	**65**
***OM3KTR**	**14**	**158,248**	**344**	**262**
*OM3TB	*	91,910	249	202
*OM6MO	*	50,700	200	169
***OM4DN**	**7**	**118,272**	**287**	**192**
***OM5KM**	**3.5**	**329,840**	**522**	**280**

BELGIUM

OT7T	**A**	**6,242,748**	**2666**	**773**
			(Op: DL2CC)	
***ON4XG**	**A**	**330,948**	**565**	**317**
***ON4ADL**	**A**	**279,462**	**501**	**282**
*ON6TJ	*	222,012	401	252
*ON4CAS	*	59,817	200	157
*ON4CBW	*	29,040	147	110
*ON4KMB	*	13,020	99	84
***ON6CW**	**14**	**273,156**	**509**	**309**
***ON4RU**	**7**	**723,334**	**666**	**397**

DENMARK

OZ8RO	**A**	**1,030,302**	**919**	**481**
OZ8SW	*	101,595	273	195
OZ4FF	*	90,951	254	183
OZ5DX	**21**	**12**	**2**	**2**
***OZ5UR**	**A**	**236,989**	**425**	**269**
***OZ1APA**	**3.5**	**1,200**	**24**	**24**

THE NETHERLANDS

PA3BUD	**A**	**69,373**	**174**	**173**
PA3GUA	*	54,495	215	173
***PAØCOE**	**A**	**613,492**	**793**	**382**
***PA3GNO**	**A**	**538,756**	**641**	**367**
*PAØCYW	*	101,888	253	199
*PAØJED	*	63,441	209	171
*PA2WJZ	*	15,744	83	82
*PA3BEJ	*	14,418	105	89
*PAØINA	*	8,710	75	65
***PI4SHB**	**14**	**129,470**	**400**	**242**
*PA3ECJ	*	41,184	189	156
***PAØMIR**	**3.5**	**73,548**	**209**	**162**

SLOVENIA

S53AJK	**A**	**4,405,313**	**2212**	**719**
			(Op: S59AA)	
S51BO	**A**	**3,560,532**	**1973**	**642**
S55A	*	1,606,770	1364	541
S5ØA	**21**	**1,401,969**	**1189**	**557**
S5ØC	**21**	**1,045,476**	**1063**	**514**
			(Op: S53RM)	
S59L	*	668,512	798	416
S58AL	**14**	**1,297,450**	**1227**	**550**
S53BM	**14**	**1,050,176**	**998**	**488**
S56A	**7**	**1,129,536**	**804**	**444**
S53F	*	134,248	274	194
S53R	**3.5**	**765,306**	**817**	**369**
S55T	**3.5**	**571,560**	**745**	**330**
			(Op: S5ØY)	
S54X	*	201,978	373	229
S52CW	*	89,976	260	163
S5ØU	**1.8**	**223,200**	**419**	**240**
***S57J**	**A**	**1,751,221**	**1300**	**527**
***S51F**	**A**	**1,565,388**	**1307**	**531**
*S52LW	*	978,591	1086	411
*S52FB	*	399,100	639	325
*S59KW	*	248,576	412	256
*S51T	*	71,142	229	167
***S52OT**	**28**	**36,120**	**222**	**140**
***S57U**	**14**	**732,204**	**859**	**473**
*S52LL	*	24,128	155	116
***S54A**	**7**	**1,054,240**	**836**	**440**
***S51W**	**3.5**	**211,584**	**401**	**228**
*S57NL	*	38,080	183	112

CONTINENTAL LEADERS

AFRICA

1.8	No Entrant	
3.5	No Entrant	
7	EA9UG	1,030,906
14	No Entrant	
21	*TU4FF	1,341,472
28	No Entrant	
AB	**3V8BB**	**11,884,728**

ASIA

1.8	4X4NJ	210,248
3.5	UA9DD	327,156
7	RU9CZE	1,412,208
14	YM2ZW	3,148,368
21	4X/OK1JR	2,018,285
28	4X1VF	69,620
AB	7X2RO	6,059,438

EUROPE

1.8	SP5GRM	249,516
3.5	**4O6A**	**919,620**
7	IR4T	2,874,690
14	HA3UU	3,874,668
21	S50A	1,401,969
28	9HØA	605,036
AB	**GIØKOW**	**6,325,953**

NORTH AMERICA

1.8	K1ZM	28,124
3.5	FM5BH	833,490
7	**V26BA**	**6,227,550**
14	ZF2NE	4,122,334
21	NP3A	1,455,790
28	**NN5AA**	**29,400**
AB	**VP5GN**	**10,675,330**

OCEANIA

1.8	YCØLOW	150
3.5	No Entrant	
7	*VK1FF	262,524
14	***VK2APK**	**1,110,990**
21	VK5GN	722,880
28	No Entrant	
A	**KHØAA**	**4,089,390**

SOUTH AMERICA

1.8	No Entrant	
3.5	*YX1D	188,448
7	**LU1IV**	**7,671,456**
14	HC2SL	3,415,258
21	ZP5XF	5,023,872
28	*LU9AUY	192,780
A	*LU1HSO	1,396,380

MULTI-SINGLE

AF	IH9/OK5DX	10,780,258
AS	**H22A**	**13,234,556**
EU	HG1S	7,575,594
NA	**NB1B**	**6,030,784**
OC	NH2C	7,086,786
SA	No Entrant	

MULTI-MULTI

AF	6V6U	9,938,896
AS	JA3ZOH	1,317,160
EU	9A1A	17,925,084
NA	WL7E	13,001,280
OC	KH7R	11,760,354
SA	No Entrant	

** = low power*

SWEDEN

SKØRQ	**A**	**1,415,557**	**1263**	**521**
			(Op: SMØDRD)	
7S6NL	**A**	**240,198**	**504**	**266**
SM5RE	*	75,168	264	174
SM3AF	*	29,348	171	116
SM5IRV	*	22,800	109	95
SMØKV	*	19,270	104	94
SK6HD	**14**	**117,448**	**266**	**212**
SMØBDS	*	72	6	6
***SM4SX**	**A**	**212,667**	**435**	**287**
***SM5COP**	**7**	**9,324**	**64**	**63**
*SMØARR	*	32	4	4

POLAND

SP4EEZ	**A**	**1,676,155**	**1269**	**535**
SP8HJC	**A**	**219,532**	**381**	**284**
SP3GTS	*	212,121	381	259
SP5CGN	*	190,280	362	268
SP4EAK	*	75,762	188	183
SP6CDP	*	22,135	101	95
SP9HWN	**28**	**1,872**	**44**	**36**
SP8IIS	**21**	**2,112**	**34**	**33**
SP2FAX	**14**	**3,092,280**	**1868**	**706**
SP7GIQ	**14**	**1,861,818**	**1428**	**582**
SP9EMV	*	63,840	200	168
SP3XR	*	47,619	165	143
SP5GRM	**1.8**	**249,516**	**431**	**261**
***SP2QCH**	**A**	**1,301,520**	**1213**	**493**
***SP9BBH**	**A**	**1,211,040**	**1126**	**480**
***SP3SLA**	**A**	**1,100,304**	**1116**	**432**
*SP1AEN	*	835,528	686	568
*SP2UKB	*	765,887	921	431
*SP8FHK	*	661,788	829	372
*SP6FZA	*	398,196	605	324
*3ZØAU	*	281,808	476	304
*SP1AFU	*	232,900	363	340
*SP3MGP	*	206,793	354	243
*SP9AGS	*	46,858	242	166
*SP6EIY	*	14,112	103	84
*SP9DXN	*	1,350	25	25
*SQ3BYH	*	1,152	32	32
*SP9KJU	*	814	25	22
***SP6SYF**	**14**	**82,321**	**240**	**191**
*SP8BAB	*	22,660	110	103
*SP6DHH	*	4,560	62	60
*SQ9CAQ	*	4,028	48	38
***SP5CNA**	**7**	**334,828**	**482**	**274**
***SP5GH**	**3.5**	**203,688**	**251**	**246**
*SP6EVX	*	120,958	300	197
*SP9EML	*	3,612	45	42

GREECE

SV2BBJ	**A**	**120,267**	**253**	**249**
SV2BFL	**21**	**60,876**	**242**	**171**
SV2BOH	**14**	**203,444**	**421**	**281**
***J41W**	**14**	**405,042**	**847**	**374**
			(Op: SV1CDN)	

DODECANESE

SV5/SMØCMH	**A**	**1,063,575**	**1502**	**489**

CRETE

***SV9/DL3MCO**	**A**	**233,750**	**498**	**275**

BOSNIA & HERZEGOVINA

T97M	**14**	**2,356,298**	**1784**	**658**
***T94YT**	**7**	**679,228**	**685**	**359**
***T93M**	**3.5**	**144,720**	**323**	**201**

CORSICA

TK5NN	**14**	**3,845,655**	**2576**	**765**

EUROPEAN RUSSIA

RN6BY	**A**	**4,522,068**	**2661**	**821**
UA4WA	**A**	**1,935,732**	**1704**	**582**
RX3APM	**A**	**1,836,896**	**1762**	**548**
RZ3AZ	*	1,397,328	1391	516
UA1QV	*	1,169,000	1280	500
UA1OMS	*	908,064	1066	432
RU3FF	*	394,370	616	349
UA6JY	*	209,272	379	259
UA3AP	*	148,836	356	237
UA1OMX	*	103,400	253	200
UA6LP	*	3,861	43	39
RA6AMU	**28**	**5,029**	**91**	**47**
RZ6FA	**14**	**2,576,112**	**1884**	**714**
RW1ZA	**14**	**2,367,144**	**1838**	**648**
UA1OSS	*	340,431	608	377
UA6LAK	*	279,395	466	323
UA3LID	**7**	**399,900**	**488**	**310**
RV6YZ	**3.5**	**192,272**	**393**	**244**
RA3UAG	*	128,960	326	208
UA4AHT	*	47,600	177	136
UA1OZ	**1.8**	**23,912**	**123**	**98**
***UA3ABJ**	**A**	**1,138,606**	**1084**	**487**
***RA3PP**	**A**	**466,549**	**689**	**379**
***RU4HY**	**A**	**404,754**	**604**	**322**
*RV1CC	*	253,440	373	256
*RV6LFE	*	118,128	312	214
*UA3RCM	*	24,462	123	81
***UA4LM**	**21**	**329,238**	**526**	**351**
***RO3A**	**14**	**1,438,906**	**1416**	**553**
			(Op: RV3ACA)	
*RU4HH	*	149,758	358	266
*RV6YB	*	113,678	290	226
*RA3VY	*	9,288	166	43
***UA3SEG**	**7**	**441,956**	**558**	**313**
*RX3DRU	*	134,664	182	181
*UA4SS	*	81,324	206	162
*UA1AQF	*	1,488	25	24
***RX3QAM**	**3.5**	**113,664**	**303**	**192**
*RA3XA	*	10,395	114	99
***RW4HHD**	**1.8**	**9,928**	**73**	**68**

UKRAINE

US9D	**A**	**3,405,458**	**2155**	**701**
			(Op: UT4UZ)	
UYØZG	**A**	**1,528,551**	**1274**	**501**
UY1HY	**A**	**1,521,558**	**1367**	**513**
EM8I	*	1,383,700	1617	505
			(Op: UT8IM)	
UT3UZ	*	1,259,856	1310	468
UT7ZT	*	868,292	1016	452
UT7ND	*	749,476	851	377
UY2ZA	*	732,996	934	396
UR5U	*	711,424	886	397
			(Op: UR5UW)	
UX5UO	*	602,160	706	386
UX3ZW	*	458,208	618	344
UR3IOB	*	417,915	600	333
UT5UJO	*	201,072	393	236
US7VL	*	149,388	274	211
UT5UGQ	*	116,500	355	233
UT9IR	*	37,544	118	104
UR7VA	**28**	**41,700**	**246**	**150**
UT5UGR	*	24,240	196	120
UY5QO	*	7,526	94	71
UU8JK	*	6,240	75	60
EO6F	**21**	**872,056**	**1161**	**488**
			(Op: UXØFF)	
UR5ZOS	*	72,312	274	184
UT7LA	*	5,250	53	50
US5WE	**14**	**2,161,341**	**1541**	**637**

Say You Saw It In CQ

EN5E	**14**	**1,659,218**	**1688**	**583**
			(Op: UT7EZ)	
US6UN	"	1,125,192	1310	519
UT3QW	"	868,496	1070	496
UT2IO	"	788,800	970	464
US2YW	**7**	**2,024,548**	**1172**	**563**
UT3C	**7**	**1,835,792**	**1029**	**518**
			(Op: UR7CW)	
UR8QX	"	1,460,480	1017	448
UX4CW	"	946,976	846	404
UTØYO	"	6,324	54	51
UX1VT	**3.5**	**142,140**	**350**	**206**
UT1WZ	"	131,704	312	202
UX3HX	"	60,828	204	137
UUØJM	**1.8**	**140,768**	**358**	**212**
***UT5UN**	**A**	**644,100**	**834**	**380**
***UX5EF**	**A**	**328,485**	**604**	**305**
***UY5TE**	**A**	**269,619**	**548**	**259**
*US8IBJ	"	246,125	523	275
*UX8IX	"	239,992	393	262
*UT8IT	"	228,238	431	278
*UR5BCJ	"	42,456	149	122
*UT4XU	"	19,118	105	79
***UR7CA**	**28**	**550**	**23**	**22**
***USØZZ**	**21**	**76,042**	**277**	**193**
***UY8IF**	**14**	**1,061,928**	**1224**	**516**
***UX3M**	**14**	**536,355**	**781**	**411**
			(Op: UR3MP)	
*UT5ECZ	"	225,423	455	297
*UU5JS	"	169,050	326	294
*UT3EM	"	125,476	330	247
*UR7QM	"	123,714	346	237
*UT7ET	"	29,718	138	117
*US5EVD	"	28,665	131	117
***UY5WA**	**7**	**107,824**	**260**	**184**
*UY5ZZ	"	10,251	73	67
***UX2MF**	**1.8**	**28,296**	**119**	**108**

LATVIA

YL8M	**A**	**2,677,536**	**1984**	**648**
YL2IP	"	12,144	70	66
YL2KO	**21**	**25,194**	**125**	**114**
YL2GN	**7**	**572,976**	**637**	**346**
***YL2KF**	**A**	**171,825**	**351**	**237**
***YL2SW**	**14**	**111,930**	**277**	**205**
***YL3IG**	**7**	**278,250**	**398**	**265**
*YL2UZ	"	253,952	396	256

ROMANIA

YO8FR	**A**	**524,832**	**724**	**336**
YO3FF	**14**	**376,480**	**583**	**362**
YO3ND	**7**	**835,706**	**786**	**383**
YQ2R	**3.5**	**490,074**	**703**	**309**
			(Op: YO2DFA)	
***YO3FWC**	**A**	**610,428**	**860**	**364**
***YO3CTK**	**A**	**587,016**	**742**	**372**
*YO4GDP	"	54,020	216	148
***YR8A**	**14**	**31,488**	**146**	**128**
			(Op: YO8AXP)	

YUGOSLAVIA

4NØAV	**A**	**4,756,840**	**2567**	**760**
4N9BW	**A**	**4,090,215**	**2411**	**743**
			(Op: LU7BW)	
YTØX	"	1,423,954	1402	527
YT1W	**28**	**50,949**	**288**	**155**
			(Op: YU1OJ)	
YU1KX	**21**	**287,914**	**520**	**253**
YT1R	**14**	**3,089,554**	**1937**	**718**
			(Op: YU1ZZ)	
YZ1KW	**14**	**1,640,456**	**1530**	**584**
YT7A	**7**	**2,653,028**	**1340**	**574**
			(Op: YU7GW)	
YZ9M	**7**	**2,343,132**	**1261**	**549**
			(Op: YU7NU)	
4O6A	**3.5**	**919,620**	**884**	**390**
			(Op: YT6A)	
4N1A	**3.5**	**736,906**	**803**	**367**
			(Op: 4N1DXX)	
YZ1AU	"	509,436	659	318
YU7KM	"	203,820	391	237
YU1EA	**1.8**	**159,720**	**352**	**220**
***YU7CB**	**A**	**1,857,905**	**1506**	**545**
***YU7WJ**	**A**	**1,070,190**	**1020**	**470**
*YU1BO	"	401,958	378	326
***YU1CV**	**28**	**120,712**	**353**	**224**
***4N7B**	**14**	**2,068,781**	**1607**	**629**
			(Op: YU7BJ)	
***YU1BAU**	**14**	**745,437**	**871**	**461**
*4N1N	"	496,120	770	405
*YU1HA	"	482,702	681	407
*YU7FN	"	82,908	242	196
***YZ1V**	**7**	**503,608**	**616**	**322**
			(Op: YU1AAV)	
***YU1KR**	**3.5**	**368,184**	**583**	**276**
***YU1RA**	**1.8**	**101,382**	**264**	**183**

MACEDONIA

Z32XX	**14**	**2,877,026**	**1984**	**718**
Z31GX	**7**	**2,001,424**	**1215**	**536**
***Z37FCA**	**A**	**2,592**	**36**	**36**
***Z32KV**	**28**	**1,276**	**36**	**29**
***Z38G**	**21**	**441,408**	**932**	**363**
			(Op: OH3MIG)	
*Z31GB	"	314,592	714	339

OCEANIA

PHILIPPINES

W4NXE/DU3	**A**	**479,410**	**644**	**251**
***DU1COO**	**A**	**302,128**	**544**	**184**

SAIPAN

KHØAA	**A**	**4,089,390**	**2028**	**503**
			(Op: KH7A)	

AUSTRALIA

VK8AV	**A**	**1,336,095**	**870**	**405**
VK3APN	**A**	**197,872**	**232**	**149**
VK5GN	**21**	**722,880**	**763**	**320**
***VK2AYD**	**A**	**1,234,170**	**1025**	**378**
*VK2EKY	"	220,988	277	202
***VK2APK**	**14**	**1,110,990**	**866**	**435**
***VK4TT**	**14**	**85,396**	**205**	**148**
***VK1FF**	**7**	**262,524**	**277**	**167**

INDONESIA

YCØLOW	**1.8**	**150**	**5**	**5**

NEW ZEALAND

ZL2AL	**A**	**446,732**	**402**	**242**

SOUTH AMERICA

BOLIVIA

CP1BA	**A**	**14,994**	**68**	**63**

URUGUAY

CX7BY	**14**	**194,045**	**329**	**197**

ECUADOR

HC1HC	**A**	**64,400**	**158**	**140**
HC2SL	**14**	**3,415,258**	**1881**	**662**

ARGENTINA

LU4MHQ	**A**	**42,900**	**136**	**110**
LU5GPL	"	39,000	125	104
LU1IV	**7**	**7,671,456**	**1857**	**702**
			(Op: LW9EUJ)	
AY7D	**3.5**	**2,596**	**25**	**22**
			(Op: LU7DW)	
***LU8HSO**	**A**	**1,396,380**	**1041**	**444**
***LU1EWL**	**A**	**716,832**	**667**	**342**
*LU1AEE	"	161,298	230	174
***LU9AUY**	**28**	**192,780**	**353**	**189**
***LU3HIP**	**28**	**183,954**	**335**	**186**
*LR2DW	"	44,388	150	108
*LW8EXF	"	544	16	16
***L5ØV**	**21**	**982,917**	**825**	**403**

BRAZIL

PU2RCM	**A**	**34,684**	**100**	**92**
PU2KER	**21**	**31,977**	**116**	**99**
PY1LVF	**7**	**405,344**	**290**	**239**
***PW2N**	**A**	**236,109**	**345**	**211**
***PY1EDB**	**A**	**130,260**	**221**	**167**
*ZW2L	"	106,196	243	139
			(Op: PU2RUX)	
*PP7CW	"	67,044	161	151
*PP7CI	"	19,565	92	91
*PV2V	"	816	16	16
			(Op: PY2KP)	
***PY2DUN**	**28**	**1,975**	**27**	**25**
***PU2MHB**	**21**	**945,906**	**804**	**402**
*PY3JRG	"	55,552	153	128
*ZW2Z	"	48,530	145	115
			(Op: PY2ZI)	
*PY2APQ	"	22,356	95	81
***PY2EYE**	**14**	**83,780**	**200**	**142**
*PT7SD	"	18,800	80	80
*PT2AW	"	1,430	23	22

VENEZUELA

***YV4GLD**	**21**	**300,000**	**428**	**240**
*YV7QP	"	14,388	77	66
***YV5AAX**	**14**	**215,196**	**305**	**237**
***YX1D**	**3.5**	**188,448**	**215**	**151**
			(Op: YV1DIG)	

PARAGUAY

ZP5XF	**21**	**5,023,872**	**2415**	**712**
			(Op: LU6BEG)	

SINGLE OPERATOR ASSISTED

UNITED STATES

WF3T	**A**	**4,147,848**	**2043**	**692**
K3MM	"	2,568,344	1368	554
K3KO	**A**	**2,012,516**	**1199**	**583**
K4MA	"	1,620,234	1032	539
N5JR	**A**	**869,568**	**721**	**448**
K3WW	"	816,007	621	359
AB2E	**A**	**690,426**	**593**	**363**
N3ED	"	683,016	610	382
W6TKF	**A**	**440,910**	**500**	**345**
AD6E	"	309,959	423	211
NT4D	"	219,072	305	224
K1TH	**A**	**137,870**	**245**	**170**
AAØCY	**A**	**17,711**	**106**	**89**
KF2O	"	13,568	68	64
KQ5DX	**14**	**1,143,136**	**1148**	**556**
			(Op: K5OT)	
N9GG	**14**	**981,368**	**837**	**488**
NØAV	**14**	**767,611**	**759**	**431**
K6CT	**14**	**495,456**	**572**	**397**
AC6DD	"	338,800	444	308
K9OSH	"	1,369	42	37
***N1MD**	**A**	**7,038**	**50**	**46**

DX

CT3BX	**A**	**9,907,569**	**3312**	**801**
			(Op: YU1RL)	
DK3GI	**A**	**4,508,640**	**2189**	**744**
DL1MFL	"	1,417,167	1121	477
IKØHBN	**A**	**622,080**	**687**	**360**
JA9XBW	**A**	**569,454**	**570**	**321**
ZZ2Z	**A**	**360,047**	**467**	**263**
JF1SEK	"	285,105	373	249
JH4NMT	"	283,696	391	238
DL3OI	"	252,180	447	270
RZØLWA	**A**	**220,080**	**423**	**262**
DJ9RR	"	101,904	246	176
EA7AGW	**A**	**85,544**	**186**	**148**
EA3AJI	"	43,268	149	116
VE3ZTH	**A**	**32,495**	**110**	**97**
PY2OU	**A**	**9,296**	**59**	**56**
S51AY	**28**	**100,580**	**388**	**214**
IK3QAR	**21**	**178,589**	**400**	**271**
S5ØR	**14**	**2,247,678**	**1582**	**647**
F5PGP	**14**	**2,056,320**	**1545**	**612**
F6IFY	"	202,909	442	287
EA3CKX	**14**	**178,712**	**408**	**251**
4O4C	**3.5**	**397,290**	**646**	**285**
			(Op: YU4AU)	
***S57XX**	**A**	**230,685**	**445**	**273**
***JK2VOC**	**A**	**171,380**	**363**	**205**
*JK1GKG	"	99,015	217	161
***EA4AUF**	**A**	**43,125**	**147**	**115**
*EA3BHK	"	37,147	131	121
***DJ6TK**	**28**	**1,400**	**36**	**35**
***JR9NVB**	**21**	**42,900**	**144**	**130**
***EA7DPU**	**14**	**762,440**	**1012**	**490**
***JH3AIU**	**14**	**422,685**	**492**	**303**
*JE1XCZ	"	92,752	228	176
***YU1UA**	**1.8**	**300**	**10**	**10**

TRIBANDER/ SINGLE ELEMENT

UNITED STATES

NY4A	**A**	**3,866,037**	**2038**	**681**
WC4E	"	2,342,480	1499	623
WV2LI	**A**	**1,797,450**	**1294**	**521**
N6MU	**A**	**1,583,088**	**1041**	**559**
KMØL	**A**	**1,519,298**	**1243**	**583**
KW2J	"	1,437,132	1138	508
KO7Z	**A**	**1,419,086**	**1129**	**569**
W4AU	"	1,275,102	934	463
N3NT	**A**	**1,104,490**	**803**	**445**
KB4GID	"	1,103,520	1009	480
KC6X	"	959,124	959	514
***WK2G**	**A**	**835,992**	**791**	**408**
***NW6S**	**A**	**688,551**	**648**	**391**
WB5B	**A**	**619,505**	**700**	**435**
***KV8Q**	**A**	**610,144**	**587**	**368**
*N2ED	"	561,005	545	365
KC1F	**A**	**402,002**	**546**	**298**
W1TE	"	391,312	410	272
K9WIE	**A**	**380,160**	**482**	**352**
NN5ZZ	"	376,992	627	352
N8AA	**A**	**358,800**	**400**	**300**
*WT8P	"	310,365	405	285
***AB5SE**	**A**	**304,560**	**481**	**324**
*NA2Q	"	288,486	383	279
*K4FPF	"	282,285	350	255
***W7QN**	**A**	**278,640**	**457**	**324**
***KEØUI**	**A**	**205,632**	**368**	**272**
*NN5T	"	171,990	297	234
***K1CB**	**A**	**171,521**	**304**	**229**
W4IF	"	168,048	280	216
*KQ1V	"	117,448	284	212
W6RFF	"	65,875	182	155
*K4OGG	"	63,096	157	132
WRØA	"	56,780	218	167
*W8PN	"	39,770	125	97
*K8SM	"	33,792	167	132
*N2KJM	"	32,396	105	89
***K6UM**	**A**	**30,303**	**126**	**117**
W4VC	"	26,037	105	99
*KGØEJ	"	2,880	32	32
*AA4LR	"	2,706	42	41
W6NKR	**14**	**66,548**	**172**	**131**

DX

3V8BB	**A**	**11,884,728**	**3650**	**778**
3DA5A	**A**	**4,431,056**	**2112**	**572**
S53AJK	**A**	**4,405,313**	**2212**	**719**

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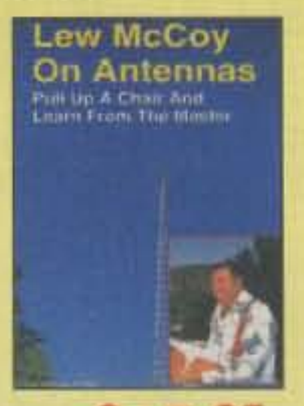

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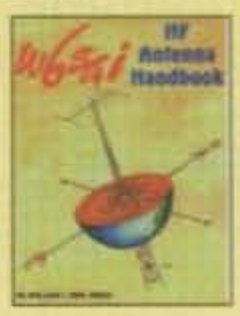

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G3ZEM	**A**	**4,106,520**	**2396**	**680**
4N9BW	**A**	**4,090,215**	**2411**	**743**
7Z5OO	**A**	**3,931,588**	**2208**	**561**
TP9CE	**A**	**3,249,624**	**2225**	**644**
4U1VIC	**A**	**2,928,723**	**2255**	**623**
LY3MR	**A**	**2,782,261**	**1817**	**643**
YL8M	**A**	**2,677,536**	**1984**	**648**
LY6M	*	2,645,739	1810	657
DL9FBS	**A**	**2,100,553**	**1438**	**533**
ES5MC	**A**	**1,976,127**	**1571**	**579**
***YU7CB**	**A**	**1,857,905**	**1506**	**545**
IUØX	**A**	**1,639,140**	**1525**	**510**
***S51F**	**A**	**1,565,388**	**1307**	**531**
YTØX	*	1,423,954	1402	527
UA9MA	**A**	**1,342,209**	**969**	**457**
OH6AG	**A**	**1,243,725**	**1090**	**515**
***UA3ABJ**	**A**	**1,138,606**	**1084**	**487**
IK5TSS	*	1,089,918	1132	453
SV5 /SMØCMH	**A**	**1,063,575**	**1502**	**489**
OK7DX	**A**	**960,725**	**1150**	**415**
***JA6UBK**	**A**	**922,647**	**781**	**383**
OH6XY	*	890,892	1170	438
F6HWU	*	836,405	1010	409
***OK2QX**	**A**	**808,974**	**919**	**426**
OH5VT	*	519,692	633	346
***EA5YU**	**A**	**484,416**	**692**	**348**
W4NXE/DU3	**A**	**479,410**	**644**	**251**
*OK1AVY	*	421,328	634	332
*JK1KNB	*	358,375	462	305
*JN1NOP	*	331,702	455	266
***OM3PQ**	**A**	**320,422**	**534**	**302**
*EA4AAF	*	307,133	579	281
***DU1COO**	**A**	**302,128**	**544**	**184**
***F5YJ**	**A**	**301,560**	**512**	**280**
***EA8ASJ**	**A**	**297,000**	**542**	**275**
F2AR	*	264,963	500	281
ZS6AJS	**A**	**236,817**	**317**	**189**
*F6IIE	*	221,400	502	270
*EA7GXD	*	208,495	386	245
*EA7KN	*	205,434	427	226
S79MAD	**A**	**202,391**	**322**	**203**
*EA4BGM	*	199,880	497	263
***9A4KA**	**A**	**169,725**	**375**	**219**
JA3ARM	**A**	**144,894**	**274**	**186**
IK1RQQ	*	137,634	313	226
*EA3BOW	*	128,691	347	237
*EA2GC	*	118,916	314	217
*IN3QBR	*	115,415	300	205
EA1FBU	*	111,639	350	199
*JH1DYV	*	104,580	240	166
*DL4OCM	*	101,712	178	163
JAØQNJ	*	100,488	230	159
***IT9AJP**	**A**	**84,488**	**256**	**179**
*JA4AQR	*	63,450	169	141
IV3TQE	*	52,360	161	140
*JF1SQC	*	48,285	150	111
***EA6ZS**	**A**	**32,472**	**170**	**132**
*EA7TG	*	32,428	139	121
UA6LP	**A**	**3,861**	**43**	**39**
***Z37FCA**	**A**	**2,592**	**36**	**36**
S53BM	**14**	**1,050,176**	**998**	**488**
***JK1OXU**	**14**	**29,165**	**115**	**95**

ROOKIE

***LY3JY**	**A**	**898,372**	**1026**	**428**
***TM6A**	**A**	**889,083**	**1088**	**447**
***F5EJC**	**A**	**486,239**	**604**	**331**
***EA2CHI**	**A**	**148,208**	**335**	**236**
***ON4CAS**	**A**	**59,817**	**200**	**157**
***ON4CBW**	**A**	**29,040**	**147**	**110**
KE6QXJ	**A**	**14,812**	**106**	**92**
***KE4OAR**	**A**	**1,235**	**20**	**19**
***NP3A**	**21**	**1,419,595**	**1113**	**485**
KGØUA	**14**	**138,744**	**279**	**246**
***JD1BJT/M**	**14**	**16,254**	**92**	**63**

BAND RESTRICTED

OH3KCB	**A**	**275,576**	**500**	**259**
LY3NJM	**A**	**184,392**	**399**	**234**
OK2BUT	**A**	**65,394**	**227**	**173**
JAØBMS/1	**A**	**50,031**	**155**	**109**
FB1AVO	**A**	**28,098**	**147**	**126**
EC3AHO	**21**	**59,786**	**221**	**167**

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

NB1B	**6,030,784**	**2471**	**736**
NQ4I	**4,730,292**	**2214**	**756**
NJ4F	4,520,334	2006	714
KVØQ	**4,333,931**	**2164**	**721**
KO7X	**2,885,397**	**1777**	**669**
KC7V	2,857,232	1875	679
NU4Y	2,639,426	1715	653
KR5DX	**2,025,660**	**1431**	**636**
NM6U	**1,611,753**	**1146**	**561**
AC8W	**844,160**	**739**	**445**
NØKE	578,330	608	383
NC3DX	**517,000**	**657**	**376**
N6HC	311,664	469	302
KJØW	194,320	428	280
WA4FLZ	185,094	360	273

NORTH AMERICA

VE7UBC	**4,254,393**	**2072**	**611**
VE7ZZZ	4,239,192	1951	692
VE6JY	**2,997,396**	**1618**	**599**
4U1UN	**445,155**	**598**	**295**

AFRICA

IH9/OK5DX	**10,780,258**	**3886**	**734**

ASIA

H22A	**13,234,556**	**4555**	**842**
JY9QJ	**9,335,424**	**3608**	**736**
EX9A	**6,777,604**	**2968**	**694**
RK9CWW	6,239,800	2415	700
JA5FDJ	**4,458,507**	**2138**	**681**
JA7YAA	3,219,625	1704	599
RK9KWI	1,074,570	825	430
JE2YHS	993,387	789	411
JA2ZJW	524,901	601	313

EUROPE

HG1S	**7,575,594**	**3706**	**805**
LZ9A	**6,317,454**	**3318**	**814**
EA3KU	**6,081,775**	**3235**	**805**
9A7A	**5,640,597**	**2738**	**839**
OM5M	**5,553,056**	**2767**	**776**
RU6LWZ	**5,201,496**	**2851**	**828**
EA6ZY	**4,763,124**	**2990**	**723**
EA5BY	4,679,488	2733	782
SL3ZV	**4,571,244**	**2766**	**774**
OL3A	**4,118,121**	**2286**	**729**
II2K	**4,075,812**	**2331**	**702**
OH7AAC	**4,074,616**	**2578**	**772**
LZ7N	4,037,280	2781	780
OHØE	**4,017,920**	**2839**	**688**
9A9ØCBD	3,966,258	2470	701
9A5ØD	3,870,156	2648	666
OF4AB	3,816,591	2569	717
EU5F	**3,709,920**	**2390**	**708**
OM3RKA	3,606,574	2160	674
LG5LG	**3,578,270**	**2343**	**703**
DK4WA	3,401,892	2038	702
DLØKF	2,935,975	1803	665
OL5T	2,881,782	1950	666
S56M	**2,856,816**	**1880**	**612**
SP2PMO	**2,688,750**	**1812**	**625**
DLØDX	2,596,596	1904	604
OI1AY	2,578,366	2113	602
HA1KRR	2,428,970	1819	586
OM9A	2,424,153	1702	599
OH8NW	2,337,000	1857	600
GX4CRC/P	**2,127,790**	**1684**	**565**
II1R	2,039,726	1942	584
EW35WB	2,004,018	1712	569
RK3AWE	1,859,456	1698	584
OH2AAZ	1,654,675	1460	547
IQ2C	1,589,697	1414	519
ED3MM	1,577,144	1739	548
9AØC	1,408,911	1309	483
DFØDFA	1,240,190	1244	490
R3K	1,234,948	1304	508
SP9KRT	962,480	1082	424
OH6RX	869,265	1006	423
DAØRG	811,125	594	309
DKØTZ	721,349	935	397
OM7F	689,832	870	402
YL1ZF	**430,947**	**796**	**297**
YL1LGS	418,488	743	329
OZ5EDR	**405,216**	**601**	**336**
IO2L	242,540	529	268
F5KAC	**204,088**	**422**	**263**
RZ1AWD	169,000	407	250
M7C	154,660	346	220
OK1KCF	59,202	171	141

OCEANIA

NH2C	**7,086,786**	**3028**	**651**
ZL1ANJ	**3,959,170**	**1813**	**566**
VK4EMM	**3,845,404**	**1688**	**566**

MULTI-OPERATOR MULTI-TRANSMITTER

UNITED STATES

KG1D	**12,361,680**	**4171**	**944**
K3EST	**7,523,901**	**3136**	**847**
N8NR	**4,249,500**	**2124**	**750**
W4MYA	**3,887,236**	**1850**	**706**

NORTH AMERICA

WL7E	**13,001,280**	**4276**	**928**
CO9RCH	**1,633,297**	**1067**	**589**

AFRICA

6V6U	**9,938,896**	**3640**	**758**

ASIA

JA3ZOH	**1,317,160**	**979**	**442**
JA7YFB	72,485	218	133

EUROPE

9A1A	**17,925,084**	**6619**	**1076**
LY5A	**13,786,112**	**5633**	**1024**
S52ZW	**12,598,976**	**5179**	**988**
RW2F	**12,089,880**	**5102**	**990**
S53M	11,138,904	4710	954
EA4ML	**10,700,800**	**5126**	**950**
PA6WPX	**10,376,642**	**4609**	**914**
OT7A	**9,550,464**	**4190**	**924**
OH2HE	**9,169,992**	**4513**	**909**
RW6AWT	**8,085,592**	**4250**	**898**
OH1AF	8,080,333	4293	883
LY7A	**7,493,904**	**3895**	**836**
OZ5W	**3,968,435**	**2246**	**703**
OZ5WQ	2,702,580	2066	620

OCEANIA

KH7R	**11,760,354**	**3868**	**822**

DISQUALIFIED: YU1DX for excessive unverifiable QSOs; XQ1IDM for excessive unverifiable QSOs.

CHECK LOGS

The following logs were used for cross checking. Check logs and SWL logs are always appreciated: CP6UH, DF4SA, DJØSH, DJ5NN, DL3JON, DL3NEO, DL5DWW, DL5JMN, DL5KVG, DL6KWU, DL6MWG, DL6UNF, DL7VAF, DL8KWA, EU2MM, EW3CW, JA1DD, JA8IKC, JO6IHV, K3SWZ, KRØI, LA9GY, LY1CY, NØXCF, NZ4/W4UE, NZ4/W4UE, OH3WR, OH6RE, OZ1EUO, OZ7QB, PAØLOU, PAØRBA, PA3EXI, PP5CIA, PU2LXC, PU2WDD, PV8ON, PY2SP, PY2SY, PY2TI, PY4CY, PY4MBJ, PY7OJ, RAØCL, RA3WDK, RU4WE, RU9CZ, RW3XA, RX3DIA, SMØCSX, SM6BZE, SP1BLE, SP2DWA, SP2QCH, SP3FAR, SP3LFV, SP4DZT, SP5CEQ, SP5FLB, SP6AUI, SP6BEN, SP6CES, SP6STS, SP6YGB, SP7BDS, SP7CKP, SP7FGA, SP7HB, SP8JMA, SV5DSX, UA1AIR, UA4AO, UA4QK, UA9MMD, UE5OXK, UE5OXN, UN7RBD, UR5EIT, UR5TAM, UX2HX, VA3TEE, W3CB, W4NTI, W6FSJ, YL2PG, YL2UZ, YO2ARV, YO4CAH, YO5CL, YO5CUU, YO5OHO, YO6LV, ZY2IQ.

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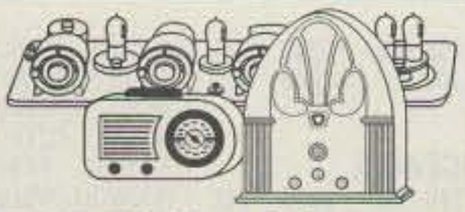

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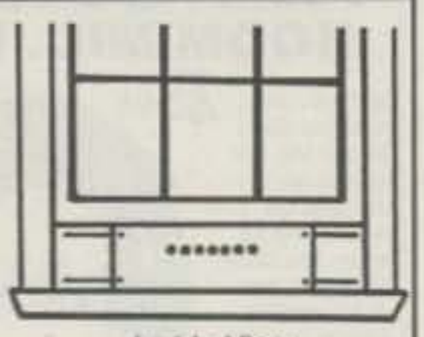

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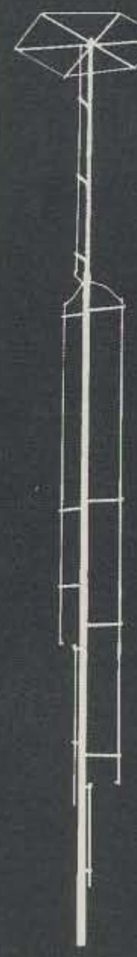


Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ–"The GAP consistently outperformed base-fed antennas...and was quieter."

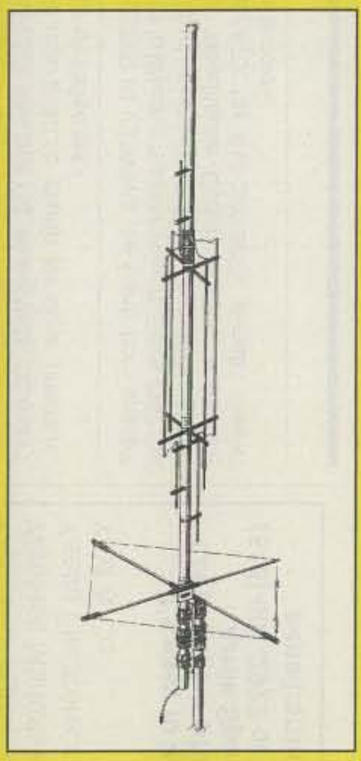
73–"This is a real DX antenna, much quieter than other verticals."

RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

Latest Release: **TITAN DX**



This all purpose antenna is designed to operate 10m-80m, WARC bands included. It sits on a 1-1/4" pipe and can be mounted close to the ground or up on a roof. Its bandwidth and no tune feature make it an ideal antenna for the limited space environment as well as a terrific addition to the antenna farm.

MODEL	BANDS OF OPERATION											HT	WT	MOUNT	COUNTER-POISE	COST
	2m	6m	10m	12m	15m	17m	20m	30m	40m	80m	160m					
Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	$259
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$269
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$299
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

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•Enhanced Digital Signal Processing (EDSP™) Noise Reducer, RX/TX waveform Contour shaping control, Digital Notch plus IF Notch, Digital CW Narrow Filters, Microphone Equalization • Shuttle Jog™ Tuning Enhancement • Directional Tuning Scale for CW/Digital Modes and Clarifier Offset Display • Selectable Antenna Jacks • Programmable Tuning Steps • 100W PO • Dual In-band Receive with Separate S-meters • Built-in Collins® SSB Mechanical Filter • CW Electronic Keyer with two Key jacks • CW Spot • Automatic Antenna Tuner • 100-117, 200-234V AC and 13.5V DC power inputs • DC version available • 99 Memories.

FT-1000/D
Elite-Class All-Mode HF Transceiver

• 200W PO • Dual Receive • 108 dB dynamic range • Cascaded IF Filters • Direct Digital Synthesis (DDS) • IF Width/Shift/Notch • CW Spot • CW Audio Peaking Filter • CW Electronic Keyer with two Key jacks • IF Noise Blanker • Automatic Antenna Tuner • RF Speech Processor • Front panel RX Antenna selector switch • Two large fly-wheel-weighted tuning knobs • 99 Memories.

FT-920
All-Mode HF/6m Transceiver

• High-Performance 33MIPS* DSP • HF + 50 MHz w/100 Watts-all Bands • MOSFET PA Finals • High Speed Auto Antenna Tuner (works on RX & TX) • Omni-Glow™ Dual Display • Twin VFO Knobs • FET RF Amplifier for High & Low Bands • Digital Voice Memory System • Quick Memory Bank (QMB)Frequency System • 127 Memories. *Million Instructions Per Second

FT-847
HF/50/144/430 MHz All Mode Transceiver DSP Filters--notch, NR and BPF •Built-in 6-Meter •Voice Monitor •Separate Sub-Band Dial •Shuttle Jog Dial •Smart Search •Digital Meter •19 Memories •100W for HF/6-Meter; 50W 2-Meter/430 MHz •Crossband Full Duplex •Normal/Reverse Tracking •CTCSS and DCS Encode/Decode •Direct Keypad Frequency Entry •1200/9600bps Packet-Ready

FT-840
High Performance Compact HF Transceiver

• High Receiver Dynamic Range • Dual Band Stacking VFOs with Direct Digital Synthesis (DDS) • 100W PO • IF Shift • IF Noise Blanker • Digital Mode Interface • CW-Reverse feature • Adjustable Repeater CTCSS Tones • Optional (External) Automatic Antenna Tuner • 100 Memories.

FT-600
Multi-Purpose HF SSB Transceiver

Frequency Range: RX: 50 kHz - 30 MHz; TX: 160-10M • 100W PO • MIL-STD 810 Rating • Alphanumeric Omni-Glow™ LCD Display • Keypad Frequency Entry • Optional CW (500 Hz) and AM (6 kHz) filters available • Dual Watch • Front-mounted Speaker with High Audio Output • PC Programmable • 100 Memories (in 4 banks of 25).

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ICOM IC-746

HF/6M/2M with IF-DSP and 100 Watts, Even On 2 Meters

PC Remote Control
Windows™ software, RS-746, developed by ICOM

Pull out more signals. DX'ing? Even faint signals buried in noise can't hide from the '746's adjustable IF-DSP noise reduction.

Eliminate adjacent frequency interference with Twin Passband Tuning, 3 optional filter slots (front panel selectable), and a selectable DSP Audio Peak Filter (320/160/80 Hz). The '746's DSP Auto Notch eliminates multiple hetrodyne signals.

One look at the large LCD display says it all. A glance "above the line" instantly lets you know all operating conditions and settings. Look "below the line" for menu selection, 5 soft key functions (which vary with the menu), passband width, and a band scope to search for signals.

Time to Upgrade
Solar Cycle 23 is just coming in to full swing. With the HF and 6 meter bands starting to opening up, there'll be more amateur fun, day and night!

UPGRADE 1998 • HEAR comes the Sun • with ICOM

Built in Auto AntennaTuner
No external antenna tuner is required for HF and 6M operation. The IC-746 is a real HF rig!

SPECIFICATIONS

Transmit: ..... HF/6 Meter/2 Meter, 100% Duty Cycle
Receive: ..... 30-60, 108-174 MHz
Quadruple conversion superhetrodyne
Mode: ..... AM, FM, FM-N, SSB, CW, RTTY
Power: ..... 5-100 Watts (2-40W, AM)
Power Supply Requirement: ... 13.8 V DC
Memory Channels: ..... 102 total, 99 regular, 2 scan edges, and 1 call
Size: ..... 11.3(W) x 4.7(H) x 12.5(D) in. 287(W) x 120(H) x 316.5(D) mm.
Weight (approx.): ..... 19 lb, 10 oz / 8.9 kg

FEATURES

- **IF-DSP (15.625 kHz)**
  - Noise Reduction
  - Automatic Notch Filter
  - Selectable Audio Peak Filter
- **Twin Pass Band Tuning (PBT)**
- **Multi-Function LCD Display**
  - Band Scope, Memory Names, Key Assignments, PBT Settings, Split Frequency, Memory Keyer Contents
- **3 Optional Filter Slots**
  - 2 for 9 MHz, 1 for 455 kHz
  - All Front Panel Selectable
- **Digital, Multi-Function Metering**
  - Signal Strength, RF Output, SWR, and ALC levels
- **Auto Antenna Tuner**
- **RF Speech Compressor (not AF)**
- **Tone Squelch and Tone Scan**
- **Auto Repeater Duplex Setting for 2 Meters**
- **Quick Split Function**
- **Complete CW Functions**
  - 4 Ch. Memory Keyer
  - Electronic Keyer
  - CW Pitch Control
  - Full Break In (QSK)
- **Vox**
- **Voice Synthesizer (opt)**
- **Triple Band Stacking Register**
  - Remembers tuner selection, preamp, antenna, mode and frequency for last 3 frequency selections

Call Button
One touch recall of user programmed frequency and mode

RF Gain and Squelch
Programmable RF gain, squelch, or both

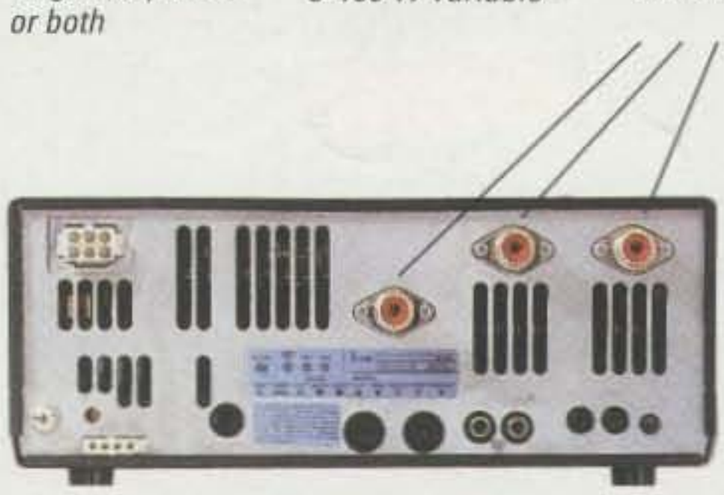
Continuously Adjustable Power Level
5-100 W variable

3 Antenna Connectors
Two for HF & 6M, and one for 2M

Digital Metering (on LCD)
Measures three parameters, all at once

SmarTune™
Automatically senses how fast you want to tune by how fast the knob is turned

Quick RIT/XIT Access
with zeroing function for today's crowded bands



PC Ready!

ICOM options required for PC operation:
CT-17 Level converter
RS-746 Windows™ Remote Control Software
OPC-478 Connection Cable

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